

Package ‘Distributacul’

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Type Package

Title Probability Distribution Functions

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Description Calculates expected values, variance, different moments (kth moment, truncated mean), stop-loss, mean excess loss, Value-at-Risk (VaR) and Tail Value-at-Risk (TVaR) as well as some density and cumulative (survival) functions of continuous, discrete and compound distributions. This package also includes a visual 'Shiny' component to enable students to visualize distributions and understand the impact of their parameters. This package is intended to expand the 'stats' package so as to enable students to develop an intuition for probability.

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BugReports https://github.com/alec42/Distributacul_Package/issues

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derlang *Density function of the Erlang distribution*

Description

Density function of the Erlang distribution with shape parameter n and rate parameter β .

Usage

derlang(x, shape, rate = 1/scale, scale = 1/rate)

Arguments

- x quantile.
- shape shape parameter n , must be positive integer.
- rate β is the rate parameter, must be positive.
- scale alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- `MGF_erlang` gives the moment generating function (MGF).
- `derlang` gives the density function.
- `perlang` gives the cumulative density function.
- `E_erlang` gives the expected value.
- `V_erlang` gives the variance.
- `kthmoment_erlang` gives the kth moment.
- `Etronq_erlang` gives the truncated mean.
- `SL_erlang` gives the stop-loss.
- `Elim_erlang` gives the limited mean.
- `Mexcess_erlang` gives the mean excess loss.
- `TVaR_erlang` gives the Tail Value-at-Risk.
- `VaR_erlang` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: `E_erlang()`, `Elim_erlang()`, `Etronq_erlang()`, `MGF_erlang()`, `Mexcess_erlang()`, `SL_erlang()`, `TVaR_erlang()`, `V_erlang()`, `VaR_erlang()`, `kthmoment_erlang()`, `perlang()`

Examples

```
# With scale parameter
derlang(x = 2, shape = 2, scale = 5)

# With rate parameter
derlang(x = 2, shape = 2, rate = 0.2)
```

Distributacalcul_vis *Interactive distribution visualization*

Description

Opens an interactive Shiny app for the selected distribution.

Usage

```
Distributacalcul_vis(law)
```

Arguments

law	Distribution to visualize, presently one of these 2 parameter continuous distributions : <ul style="list-style-type: none"> • "norm": Normal distribution. • "lnorm": Lognormal distribution. • "gamma": Gamma distribution. • "beta": Beta distribution. • "unif": Uniform distribution. • "llogis": Log-logistic distribution. • "weibull": Weibull distribution. • "pareto": Pareto distribution.
-----	--

Value

Launches Shiny application.

Examples

```
## Only run this example in interactive R sessions
if (interactive()) {
  Distributacalcul_vis("norm")
}
```

d_pareto

Density function of the Pareto distribution

Description

Density function of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
d_pareto(x, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

x	quantile.
shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
d_pareto(x = 2, shape = 2, scale = 5)

# With rate parameter
d_pareto(x = 2, shape = 2, rate = 5)
```


d_unifD

*Probability mass function of the (discrete) Uniform Distribution***Description**

Probability mass function of the (discrete) Uniform distribution with min a and max b .

Usage

```
d_unifD(x, min = 0, max = 1)
```

Arguments

x	quantile. By definition, it has no impact on the uniform distribution. Set to 1 by default.
min, max	lower and upper limits of the distribution. Must be finite.

Details

The (discrete) uniform distribution with min and max parameters a and b respectively has density:

$$\Pr(X = x) = \frac{1}{b - a + 1}$$

for $x \in \{a, a + 1, \dots, b - 1, b\}$.

Value

Function :

- [E_unifD](#) gives the expected value.
- [V_unifD](#) gives the variance.
- [d_unifD](#) gives the density function.
- [d_unifD](#) gives the cumulative density function.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Discrete Uniform Distribution: [E_unifD\(\)](#), [V_unifD\(\)](#), [p_unifD\(\)](#)

Examples

```
# With scale parameter
d_unifD(x = 2, min = 2, max = 5)
```

Elim_beta

*Limited mean of the Beta distribution***Description**

Limited mean of the Beta distribution with shape parameters α and β .

Usage

```
Elim_beta(d, shape1, shape2)
```

Arguments

d	cut-off value. Recall the the domain is limited between 0 and 1.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
Elim_beta(d = 0.3, shape1 = 4, shape2 = 5)
```

Elim_burr

Limited mean of the Burr distribution

Description

Limited mean of the Burr distribution with shape α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
Elim_burr(d, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Etroung_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With rate parameter
Elim_burr(d = 2, rate = 2, shape1 = 2, shape2 = 5)

# With scale parameter
Elim_burr(d = 2, scale = 0.5, shape1 = 2, shape2 = 5)
```

Elim_erlang

Limited mean of the Erlang distribution

Description

Limited mean of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
Elim_erlang(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
Elim_erlang(d = 2, shape = 2, scale = 5)

# With rate parameter
Elim_erlang(d = 2, shape = 2, rate = 0.2)
```

Elim_exp

Limited mean of the Exponential distribution

Description

Limited mean of the Exponential distribution with rate parameter β .

Usage

```
Elim_exp(d, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [E_exp\(\)](#), [Etronq_exp\(\)](#), [MGF_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [VaR_exp\(\)](#), [kthmoment_exp\(\)](#)

Examples

```
# With scale parameter
Elim_exp(d = 2, scale = 4)

# With rate parameter
Elim_exp(d = 2, rate = 0.25)
```

Elim_gamma

*Limited mean of the Gamma distribution***Description**

Limited mean of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
Elim_gamma(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
Elim_gamma(d = 2, shape = 3, scale = 4)

# With rate parameter
Elim_gamma(d = 2, shape = 3, rate = 0.25)
```

Elim_IG

*Limited mean of the Inverse Gaussian distribution***Description**

Limited mean of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
Elim_IG(d, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.

- `Mexcess_IG` gives the mean excess loss.
- `TVaR_IG` gives the Tail Value-at-Risk.
- `VaR_IG` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: `E_IG()`, `Etronq_IG()`, `MGF_IG()`, `Mexcess_IG()`, `SL_IG()`, `TVaR_IG()`, `V_IG()`, `VaR_IG()`

Examples

```
Elim_IG(d = 2, mean = 2, shape = 5)
```

Elim_llogis

Limited mean of the Loglogistic distribution

Description

Limited mean of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
Elim_llogis(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter τ , must be positive integer.
<code>rate</code>	alternative parameterization the scale parameter, $\text{rate} = 1 / \text{scale}$.
<code>scale</code>	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- `E_llogis` gives the expected value.
- `V_llogis` gives the variance.
- `kthmoment_llogis` gives the kth moment.
- `Etronq_llogis` gives the truncated mean.
- `SL_llogis` gives the stop-loss.
- `Elim_llogis` gives the limited mean.
- `Mexcess_llogis` gives the mean excess loss.
- `TVaR_llogis` gives the Tail Value-at-Risk.
- `VaR_llogis` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: `E_llogis()`, `Etronq_llogis()`, `Mexcess_llogis()`, `SL_llogis()`, `TVaR_llogis()`, `V_llogis()`, `VaR_llogis()`, `kthmoment_llogis()`

Examples

```
# With scale parameter
Elim_llogis(d = 2, shape = 2, scale = 5)

# With rate parameter
Elim_llogis(d = 2, shape = 2, rate = 0.2)
```

Elim_Inorm

Limited mean of the Lognormal distribution

Description

Limited mean of the Lognormal distribution with mean μ and variance σ .

Usage

```
Elim_Inorm(d, meanlog, sdlog)
```

Arguments

<code>d</code>	cut-off value.
<code>meanlog</code>	location parameter μ .
<code>sdlog</code>	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_lnorm](#) gives the expected value.
- [V_lnorm](#) gives the variance.
- [kthmoment_lnorm](#) gives the kth moment.
- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
Elim_lnorm(d = 2, meanlog = 2, sdlog = 5)
```

Elim_norm

Limited mean of the Normal distribution

Description

Limited mean of the Normal distribution with mean μ and variance σ .

Usage

```
Elim_norm(d, mean = 0, sd = 1)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}, \mu \in \mathcal{R}, \sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Etronq_norm()`, `MGF_norm()`, `Mexcess_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
Elim_norm(d = 2, mean = 2, sd = 5)
```

Elim_pareto

*Limited mean of the Pareto distribution***Description**

Limited mean of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
Elim_pareto(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
Elim_pareto(d = 4, shape = 5, rate = 2)

# With rate parameter
Elim_pareto(d = 4, shape = 5, scale = 0.5)
```

Elim_unif

Limited mean of the Uniform distribution

Description

Limited mean of the Uniform distribution with min a and max b .

Usage

```
Elim_unif(d, min = 0, max = 1)
```

Arguments

d cut-off value.
 min, max lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the k th moment.
- [Etronq_unif](#) gives the truncated mean.

- `SL_unif` gives the stop-loss.
- `Elim_unif` gives the limited mean.
- `Mexcess_unif` gives the mean excess loss.
- `TVaR_unif` gives the Tail Value-at-Risk.
- `VaR_unif` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: `E_unif()`, `Etronq_unif()`, `Mexcess_unif()`, `SL_unif()`, `TVaR_unif()`, `V_unif()`, `VaR_unif()`, `kthmoment_unif()`

Examples

```
Elim_unif(d = 3, min = 2, max = 4)
```

Elim_weibull

Limited mean of the Weibull distribution

Description

Limited mean of the Weibull distribution with shape parameter τ and rate parameter β .

Usage

```
Elim_weibull(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter τ , must be positive integer.
<code>rate</code>	β is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- `E_weibull` gives the expected value.
- `V_weibull` gives the variance.
- `kthmoment_weibull` gives the kth moment.
- `Etronq_weibull` gives the truncated mean.
- `SL_weibull` gives the stop-loss.
- `Elim_weibull` gives the limited mean.
- `Mexcess_weibull` gives the mean excess loss.
- `TVaR_weibull` gives the Tail Value-at-Risk.
- `VaR_weibull` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: `E_weibull()`, `Etronq_weibull()`, `Mexcess_weibull()`, `SL_weibull()`, `TVaR_weibull()`, `V_weibull()`, `VaR_weibull()`, `kthmoment_weibull()`

Examples

```
# With scale parameter
Elim_weibull(d = 2, shape = 2, scale = 5)

# With rate parameter
Elim_weibull(d = 2, shape = 2, rate = 0.2)
```

Etronq_beta

Truncated mean of the Beta distribution

Description

Truncated mean of the Beta distribution with shape parameters α and β .

Usage

```
Etronq_beta(d, shape1, shape2, less.than.d = TRUE)
```

Arguments

<code>d</code>	cut-off value. Recall the the domain is limited between 0 and 1.
<code>shape1</code>	shape parameter α , must be positive.
<code>shape2</code>	shape parameter β , must be positive.
<code>less.than.d</code>	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
Etronq_beta(d = 0.4, shape1 = 4, shape2 = 5)
Etronq_beta(d = 0.4, shape1 = 4, shape2 = 5, less.than.d = FALSE)
```

Etronq_binom

Truncated mean of the Binomial distribution

Description

Truncated mean of the Binomial distribution with size n and probability of success p .

Usage

```
Etronq_binom(d, size, prob, less.than.d = TRUE)
```

Arguments

d	cut-off value.
size	Number of trials (0 or more).
prob	Probability of success on each trial.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- [MGF_binom](#) gives the moment generating function (MGF).
- [E_binom](#) gives the expected value.
- [V_binom](#) gives the variance.
- [Etronq_binom](#) gives the truncated mean.
- [TVaR_binom](#) gives the Tail Value-at-Risk.
- [VaR_binom](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: [E_binom\(\)](#), [MGF_binom\(\)](#), [PGF_binom\(\)](#), [TVaR_binom\(\)](#), [V_binom\(\)](#), [VaR_binom\(\)](#)

Examples

```
Etronq_binom(d = 2, size = 3, prob = 0.5)
Etronq_binom(d = 0, size = 3, prob = 0.5, less.than.d = FALSE)
```

Etronq_burr *Truncated mean of the Burr distribution*

Description

Truncated mean of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
Etronq_burr(
  d,
  shape1,
  shape2,
  rate = 1/scale,
  scale = 1/rate,
  less.than.d = TRUE
)
```

Arguments

d	cut-off value.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.

- `SL_burr` gives the stop-loss.
- `Elim_burr` gives the limited mean.
- `Mexcess_burr` gives the mean excess loss.
- `TVaR_burr` gives the Tail Value-at-Risk.
- `VaR_burr` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: `E_burr()`, `Elim_burr()`, `Mexcess_burr()`, `SL_burr()`, `TVaR_burr()`, `V_burr()`, `VaR_burr()`, `kthmoment_burr()`

Examples

```
# With rate parameter
Etronq_burr(d = 2, rate = 2, shape1 = 2, shape2 = 5)

# With scale parameter
Etronq_burr(d = 2, scale = 0.5, shape1 = 2, shape2 = 5)

# Values greater than d
Etronq_burr(d = 2, scale = 0.5, shape1 = 2, shape2 = 5, less.than.d = FALSE)
```

Etronq_erlang

Truncated mean of the Erlang distribution

Description

Truncated mean of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
Etronq_erlang(d, shape, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter n , must be positive integer.
<code>rate</code>	β is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.
<code>less.than.d</code>	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- `MGF_erlang` gives the moment generating function (MGF).
- `derlang` gives the density function.
- `perlang` gives the cumulative density function.
- `E_erlang` gives the expected value.
- `V_erlang` gives the variance.
- `kthmoment_erlang` gives the kth moment.
- `Etronq_erlang` gives the truncated mean.
- `SL_erlang` gives the stop-loss.
- `Elim_erlang` gives the limited mean.
- `Mexcess_erlang` gives the mean excess loss.
- `TVaR_erlang` gives the Tail Value-at-Risk.
- `VaR_erlang` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: `E_erlang()`, `Elim_erlang()`, `MGF_erlang()`, `Mexcess_erlang()`, `SL_erlang()`, `TVaR_erlang()`, `V_erlang()`, `VaR_erlang()`, `derlang()`, `kthmoment_erlang()`, `perlang()`

Examples

```
# With scale parameter
Etronq_erlang(d = 2, shape = 2, scale = 5)

# With rate parameter
Etronq_erlang(d = 2, shape = 2, rate = 0.2)

# Values greater than d
Etronq_erlang(d = 2, shape = 2, rate = 0.2, less.than.d = FALSE)
```

Etronq_exp

*Truncated mean of the Exponential distribution***Description**

Truncated mean of the Exponential distribution with rate parameter β .

Usage

Etronq_exp(d, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)

Arguments

d	cut-off value.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values \leq d, otherwise, for values $>$ d.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [E_exp\(\)](#), [Elim_exp\(\)](#), [MGF_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [VaR_exp\(\)](#), [kthmoment_exp\(\)](#)

Examples

```
# With scale parameter
Etronq_exp(d = 2, scale = 4)

# With rate parameter
Etronq_exp(d = 2, rate = 0.25, less.than.d = FALSE)
```

Etronq_gamma	<i>Truncated mean of the Gamma distribution</i>
--------------	---

Description

Truncated mean of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
Etronq_gamma(d, shape, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)
```

Arguments

d	cut-off value.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
Etronq_gamma(d = 2, shape = 3, scale = 4)

# With rate parameter
Etronq_gamma(d = 2, shape = 3, rate = 0.25)

# values greather than d
Etronq_gamma(d = 2, shape = 3, rate = 0.25, less.than.d = FALSE)
```

Etronq_IG

Truncated mean of the Inverse Gaussian distribution

Description

Truncated mean of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
Etronq_IG(
  d,
  mean,
  shape = dispersion * mean^2,
  dispersion = shape/mean^2,
  less.than.d = TRUE
)
```


Arguments

d	cut-off value.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
Etronq_IG(d = 2, mean = 2, shape = 5)
```

Etronq_llogis

*Truncated mean of the Loglogistic distribution***Description**

Truncated mean of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
Etronq_llogis(d, shape, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [E_llogis\(\)](#), [Elim_llogis\(\)](#), [Mexcess_llogis\(\)](#), [SL_llogis\(\)](#), [TVaR_llogis\(\)](#), [V_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
Etronq_llogis(d = 2, shape = 2, scale = 5)

# With rate parameter
Etronq_llogis(d = 2, shape = 2, rate = 0.2)

# values greather than d
Etronq_llogis(d = 2, shape = 2, rate = 0.2, less.than.d = FALSE)
```

Etronq_Inorm

Truncated mean of the Lognormal distribution

Description

Truncated mean of the Lognormal distribution with mean μ and variance σ .

Usage

```
Etronq_Inorm(d, meanlog, sdlog, less.than.d = TRUE)
```

Arguments

d	cut-off value.
meanlog	location parameter μ .
sdlog	standard deviation σ , must be positive.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_lnorm](#) gives the expected value.
- [V_lnorm](#) gives the variance.
- [kthmoment_lnorm](#) gives the kth moment.
- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
Etronq_lnorm(d = 2, meanlog = 2, sdlog = 5)
```

Etronq_norm

Truncated mean of the Normal distribution

Description

Truncated mean of the Normal distribution with mean μ and variance σ .

Usage

```
Etronq_norm(d, mean = 0, sd = 1, less.than.d = TRUE)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}, \mu \in \mathcal{R}, \sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `MGF_norm()`, `Mexcess_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
Etronq_norm(d = 2, mean = 2, sd = 5)
```

Etronq_pareto

Truncated mean of the Pareto distribution

Description

Truncated mean of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
Etronq_pareto(d, shape, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)
```

Arguments

d	cut-off value.
shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values \leq d, otherwise, for values $>$ d.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
Etronq_pareto(d = 4, shape = 5, rate = 2)

# With rate parameter
Etronq_pareto(d = 4, shape = 5, scale = 0.5)
```

Etronq_pois

*Truncated mean of the Poisson distribution***Description**

Truncated mean of the Poisson distribution with rate parameter λ .

Usage

```
Etronq_pois(d, lambda, k0, less.than.d = TRUE)
```

Arguments

d	cut-off value.
lambda	Rate parameter λ .
k0	point up to which to sum the distribution to approximate the expected value.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [E_pois\(\)](#), [MGF_pois\(\)](#), [PGF_pois\(\)](#), [TVaR_pois\(\)](#), [V_pois\(\)](#)

Examples

```
Etronq_pois(d = 0, lambda = 2, k0 = 2E2, less.than.d = FALSE)
Etronq_pois(d = 2, lambda = 2, k0 = 2E2, less.than.d = TRUE)
```

Etronq_unif

Truncated mean of the Uniform distribution

Description

Truncated mean of the Uniform distribution with min a and max b .

Usage

```
Etronq_unif(d, min = 0, max = 1, less.than.d = TRUE)
```

Arguments

d	cut-off value.
min, max	lower and upper limits of the distribution. Must be finite.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- `E_unif` gives the expected value.
- `V_unif` gives the variance.
- `kthmoment_unif` gives the kth moment.
- `Etronq_unif` gives the truncated mean.
- `SL_unif` gives the stop-loss.
- `Elim_unif` gives the limited mean.
- `Mexcess_unif` gives the mean excess loss.
- `TVaR_unif` gives the Tail Value-at-Risk.
- `VaR_unif` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Mexcess_unif\(\)](#), [SL_unif\(\)](#), [TVaR_unif\(\)](#), [V_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
Etronq_unif(d = 3, min = 2, max = 4)

# Values greather than d
Etronq_unif(d = 3, min = 2, max = 4, less.than.d = FALSE)
```

Etronq_weibull	<i>Truncated mean of the Weibull distribution</i>
----------------	---

Description

Truncated mean of the Weibull distribution with shape parameter parameter τ and rate parameter β .

Usage

```
Etronq_weibull(d, shape, rate = 1/scale, scale = 1/rate, less.than.d = TRUE)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
less.than.d	logical; if TRUE (default) truncated mean for values $\leq d$, otherwise, for values $> d$.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- [E_weibull](#) gives the expected value.
- [V_weibull](#) gives the variance.
- [kthmoment_weibull](#) gives the kth moment.
- [Etronq_weibull](#) gives the truncated mean.
- [SL_weibull](#) gives the stop-loss.
- [Elim_weibull](#) gives the limited mean.
- [Mexcess_weibull](#) gives the mean excess loss.
- [TVaR_weibull](#) gives the Tail Value-at-Risk.
- [VaR_weibull](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
Etronq_weibull(d = 2, shape = 2, scale = 5)

# With rate parameter
Etronq_weibull(d = 2, shape = 2, rate = 0.2)

# Mean of values greater than d
Etronq_weibull(d = 2, shape = 2, rate = 0.2, less.than.d = FALSE)
```

E_beta

Expected value of the Beta distribution

Description

Expected value of the Beta distribution with shape parameters α and β .

Usage

```
E_beta(shape1, shape2)
```

Arguments

shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
E_beta(shape1 = 3, shape2 = 5)
```

E_binom

*Expected value of the Binomial distribution***Description**

Expected value of the Binomial distribution with size n and probability of success p .

Usage

```
E_binom(size, prob)
```

Arguments

size	Number of trials (0 or more).
prob	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- [MGF_binom](#) gives the moment generating function (MGF).
- [E_binom](#) gives the expected value.
- [V_binom](#) gives the variance.
- [Etronq_binom](#) gives the truncated mean.
- [TVaR_binom](#) gives the Tail Value-at-Risk.
- [VaR_binom](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: [Etronq_binom\(\)](#), [MGF_binom\(\)](#), [PGF_binom\(\)](#), [TVaR_binom\(\)](#), [V_binom\(\)](#), [VaR_binom\(\)](#)

Examples

```
E_binom(size = 3, prob = 0.5)
```

E_burr	<i>Expected value of the Burr distribution</i>
--------	--

Description

Expected value of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
E_burr(shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
E_burr(rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
E_burr(scale = 0.5, shape1 = 2, shape2 = 5)
```

E_erlang

Expected value of the Erlang distribution

Description

Expected value of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
E_erlang(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.

- `E_erlang` gives the expected value.
- `V_erlang` gives the variance.
- `kthmoment_erlang` gives the kth moment.
- `Etronq_erlang` gives the truncated mean.
- `SL_erlang` gives the stop-loss.
- `Elim_erlang` gives the limited mean.
- `Mexcess_erlang` gives the mean excess loss.
- `TVaR_erlang` gives the Tail Value-at-Risk.
- `VaR_erlang` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: `Elim_erlang()`, `Etronq_erlang()`, `MGF_erlang()`, `Mexcess_erlang()`, `SL_erlang()`, `TVaR_erlang()`, `V_erlang()`, `VaR_erlang()`, `derlang()`, `kthmoment_erlang()`, `perlang()`

Examples

```
# With scale parameter
E_erlang(shape = 2, scale = 5)

# With rate parameter
E_erlang(shape = 2, rate = 0.2)
```

E_exp

Expected value of the Exponential distribution

Description

Expected value of the Exponential distribution with rate parameter β .

Usage

```
E_exp(rate = 1/scale, scale = 1/rate)
```

Arguments

rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [Elim_exp\(\)](#), [Etronq_exp\(\)](#), [MGF_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [VaR_exp\(\)](#), [kthmoment_exp\(\)](#)

Examples

```
# With scale parameter
E_exp(scale = 4)

# With rate parameter
E_exp(rate = 0.25)
```

E_gamma	<i>Expected value of the Gamma distribution</i>
---------	---

Description

Expected value of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
E_gamma(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
E_gamma(shape = 3, scale = 4)

# With rate parameter
E_gamma(shape = 3, rate = 0.25)
```

E_hyper	<i>Expected value of the Hypergeometric distribution</i>
---------	--

Description

Expected value of the Hypergeometric distribution where we have a sample of k balls from an urn containing N of which m are white and n are black.

Usage

```
E_hyper(N = n + m, m, n = N - m, k)
```

Arguments

N	Total number of balls (white and black) in the urn. $N = n + m$
m	Number of white balls in the urn.
n	Number of black balls in the urn. Can specify n instead of N.
k	Number of balls drawn from the urn, $k = 0, 1, \dots, m + n$.

Details

The Hypergeometric distribution for N total items of which m are of one type and n of the other and from which k items are picked has probability mass function :

$$Pr(X = x) = \frac{\binom{m}{x} \binom{n}{k-x}}{\binom{N}{k}}$$

for $x = 0, 1, \dots, \min(k, m)$.

Value

Function :

- [E_hyper](#) gives the expected value.
- [V_hyper](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Hypergeometric Distribution: [V_hyper\(\)](#)

Examples

```
# With total balls specified
E_hyper(N = 5, m = 2, k = 2)

# With number of each colour of balls specified
E_hyper(m = 2, n = 3, k = 2)
```

E_IG

Expected value of the Inverse Gaussian distribution

Description

Expected value of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
E_IG(mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.

- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
E_IG(mean = 2, shape = 5)
```

E_llogis

Expected value of the Loglogistic distribution

Description

Expected value of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
E_llogis(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [Elim_llogis\(\)](#), [Etronq_llogis\(\)](#), [Mexcess_llogis\(\)](#), [SL_llogis\(\)](#), [TVaR_llogis\(\)](#), [V_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
E_llogis(shape = 3, scale = 5)

# With rate parameter
E_llogis(shape = 3, rate = 0.2)
```

E_lnorm	<i>Expected value of the Lognormal distribution</i>
---------	---

Description

Expected value of the Lognormal distribution with mean μ and variance σ .

Usage

```
E_lnorm(meanlog, sdlog)
```

Arguments

meanlog	location parameter μ .
sdlog	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_lnorm](#) gives the expected value.
- [V_lnorm](#) gives the variance.
- [kthmoment_lnorm](#) gives the kth moment.
- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
E_lnorm(meanlog = 3, sdlog = 5)
```

E_logarithmic

Expected value of the Logarithmic distribution

Description

Expected value of the Logarithmic distribution with probability parameter γ .

Usage

```
E_logarithmic(prob)
```

Arguments

prob probability parameter γ .

Details

The Logarithmic distribution with probability parameter γ has probability mass function

$$Pr(X = k) = \frac{-\gamma^k}{\ln(1 - \gamma)k}$$

, for $k = 0, 1, 2, \dots$, and $\gamma \in (0, 1]$

Value

Function :

- [MGF_logarithmic](#) gives the moment generating function (MGF).
- [PGF_logarithmic](#) gives the probability generating function (PGF).
- [E_logarithmic](#) gives the expected value.
- [V_logarithmic](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Logarithmic Distribution: [MGF_logarithmic\(\)](#), [PGF_logarithmic\(\)](#), [V_logarithmic\(\)](#)

Examples

```
E_logarithmic(prob = 0.50)
```

E_negbinom

Expected value of the negative binomial distribution

Description

Expected value of the negative binomial distribution with parameters r (number of successful trials) and p (probability of success).

Usage

```
E_negbinom(
  size,
  prob = (1/(1 + beta)),
  beta = ((1 - prob)/prob),
  nb_tries = FALSE
)
```

Arguments

size	Number of successful trials.
prob	Probability of success.
beta	Alternative parameterization of the negative binomial distribution where beta = (1 - p) / p.
nb_tries	logical; if FALSE (default) number of trials until the rth success, otherwise, number of failures until the rth success.

Details

When k is the number of failures until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{r+k-1}{k} (p)^r (1-p)^k$$

for $k \in \{0, 1, \dots\}$

When k is the number of trials until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{k-1}{r-1} (p)^r (1-p)^{k-r}$$

for $k \in \{r, r+1, r+2, \dots\}$

The alternative parameterization of the negative binomial with parameter β , and k being the number of trials, has density:

$$\frac{\Gamma(r+k)}{\Gamma(r)k!} \left(\frac{1}{1+\beta}\right)^r \left(\frac{\beta}{1+\beta}\right)^{k-r}$$

for $k \in \{0, 1, \dots\}$

Value

Function :

- [MGF_negbinom](#) gives the moment generating function (MGF).
- [PGF_negbinom](#) gives the probability generating function (PGF).
- [E_negbinom](#) gives the expected value.
- [V_negbinom](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Negative Binomial Distribution: [MGF_negbinom\(\)](#), [PGF_negbinom\(\)](#), [V_negbinom\(\)](#)

Examples

```
# Where k is the number of trials for a rth success
E_negbinom(size = 2, prob = .4)

# Where k is the number of failures before a rth success
E_negbinom(size = 2, prob = .4, nb_tries = TRUE)

# With alternative parameterization where k is the number of trials
E_negbinom(size = 2, beta = 1.5)
```

E_norm	<i>Expected value of the Normal distribution</i>
--------	--

Description

Expected value of the Normal distribution with mean μ and variance σ .

Usage

```
E_norm(mean, sd)
```

Arguments

mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [MGF_norm](#) gives the moment generating function (MGF).
- [E_norm](#) gives the expected value.
- [V_norm](#) gives the variance.
- [Etronq_norm](#) gives the truncated mean.
- [SL_norm](#) gives the stop-loss.
- [Elim_norm](#) gives the limited mean.

- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `Elim_norm()`, `Etronq_norm()`, `MGF_norm()`, `Mexcess_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
E_norm(mean = 3, sd = 5)
```

E_pareto

Expected value of the Pareto distribution

Description

Expected value of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
E_pareto(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
E_pareto(shape = 5, rate = 2)

# With rate parameter
E_pareto(shape = 5, scale = 0.5)
```

E_pois

Expected value of the Poisson distribution

Description

Expected value of the Poisson distribution with rate parameter λ .

Usage

```
E_pois(lambda)
```

Arguments

lambda Rate parameter λ .

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [Etronq_pois\(\)](#), [MGF_pois\(\)](#), [PGF_pois\(\)](#), [TVaR_pois\(\)](#), [V_pois\(\)](#)

Examples

```
E_pois(lambda = 3)
```

E_unif

Expected value of the Uniform distribution

Description

Expected value of the Uniform distribution with min a and max b .

Usage

```
E_unif(min = 0, max = 1)
```

Arguments

min, max lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- `E_unif` gives the expected value.
- `V_unif` gives the variance.
- `kthmoment_unif` gives the kth moment.
- `Etronq_unif` gives the truncated mean.
- `SL_unif` gives the stop-loss.
- `Elim_unif` gives the limited mean.
- `Mexcess_unif` gives the mean excess loss.
- `TVaR_unif` gives the Tail Value-at-Risk.
- `VaR_unif` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [Mexcess_unif\(\)](#), [SL_unif\(\)](#), [TVaR_unif\(\)](#), [V_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
E_unif(min = 3, max = 4)
```

E_unifD

Expected value of the (discrete) Uniform distribution

Description

Expected value of the (discrete) Uniform distribution with min a and max b .

Usage

```
E_unifD(min = 0, max = 1)
```

Arguments

min, max lower and upper limits of the distribution. Must be finite.

Details

The (discrete) uniform distribution with min and max parameters a and b respectively has density:

$$\Pr(X = x) = \frac{1}{b - a + 1}$$

for $x \in \{a, a + 1, \dots, b - 1, b\}$.

Value

Function :

- `E_unifD` gives the expected value.
- `V_unifD` gives the variance.
- `d_unifD` gives the density function.
- `D_unifD` gives the cumulative density function.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Discrete Uniform Distribution: `V_unifD()`, `d_unifD()`, `p_unifD()`

Examples

```
# With scale parameter
E_unifD(min = 2, max = 5)
```

E_weibull

Expected value of the Weibull distribution

Description

Expected value of the Weibull distribution with shape parameter τ and rate parameter β .

Usage

```
E_weibull(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- [E_weibull](#) gives the expected value.
- [V_weibull](#) gives the variance.
- [kthmoment_weibull](#) gives the kth moment.
- [Etronq_weibull](#) gives the truncated mean.
- [SL_weibull](#) gives the stop-loss.
- [Elim_weibull](#) gives the limited mean.
- [Mexcess_weibull](#) gives the mean excess loss.
- [TVaR_weibull](#) gives the Tail Value-at-Risk.
- [VaR_weibull](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
E_weibull(shape = 2, scale = 5)

# With rate parameter
E_weibull(shape = 2, rate = 0.2)
```

kthmoment_beta	<i>kth moment of the Beta distribution</i>
----------------	--

Description

kth moment of the Beta distribution with shape parameters α and β .

Usage

```
kthmoment_beta(k, shape1, shape2)
```

Arguments

k	kth-moment.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#)

Examples

```
kthmoment_beta(k = 3, shape1 = 4, shape2 = 5)
```

kthmoment_burr	<i>kth moment of the Burr distribution</i>
----------------	--

Description

kth moment of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
kthmoment_burr(k, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#)

Examples

```
# With scale parameter
kthmoment_burr(k = 1, rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
kthmoment_burr(k = 1, scale = 0.5, shape1 = 2, shape2 = 5)
```

kthmoment_erlang	<i>kth moment of the Erlang distribution</i>
------------------	--

Description

kth moment of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
kthmoment_erlang(k, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
kthmoment_erlang(k = 2, shape = 2, scale = 5)

# With rate parameter
kthmoment_erlang(k = 2, shape = 2, rate = 0.2)
```

<code>kthmoment_exp</code>	<i>kth moment of the Exponential distribution</i>
----------------------------	---

Description

kth moment of the Exponential distribution with rate parameter β .

Usage

```
kthmoment_exp(k, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [E_exp\(\)](#), [Elim_exp\(\)](#), [Etronq_exp\(\)](#), [MGF_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [VaR_exp\(\)](#)

Examples

```
# With scale parameter
kthmoment_exp(k = 2, scale = 4)

# With rate parameter
kthmoment_exp(k = 2, rate = 0.25)
```

kthmoment_gamma	<i>kth moment of the Gamma distribution</i>
-----------------	---

Description

kth moment of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
kthmoment_gamma(k, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#)

Examples

```
# With scale parameter
kthmoment_gamma(k = 2, shape = 3, scale = 4)

# With rate parameter
kthmoment_gamma(k = 2, shape = 3, rate = 0.25)
```

kthmoment_llogis	<i>kth moment of the Loglogistic distribution</i>
------------------	---

Description

kth moment of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
kthmoment_llogis(k, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.

- `Mexcess_llogis` gives the mean excess loss.
- `TVaR_llogis` gives the Tail Value-at-Risk.
- `VaR_llogis` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: `E_llogis()`, `Elim_llogis()`, `Etronq_llogis()`, `Mexcess_llogis()`, `SL_llogis()`, `TVaR_llogis()`, `V_llogis()`, `VaR_llogis()`

Examples

```
# With scale parameter
kthmoment_llogis(k = 2, shape = 3, scale = 5)

# With rate parameter
kthmoment_llogis(k = 2, shape = 3, rate = 0.2)
```

<code>kthmoment_lnorm</code>	<i>kth moment of the Lognormal distribution</i>
------------------------------	---

Description

kth moment of the Lognormal distribution with mean μ and variance σ .

Usage

```
kthmoment_lnorm(k, meanlog, sdlog)
```

Arguments

<code>k</code>	kth-moment.
<code>meanlog</code>	location parameter μ .
<code>sdlog</code>	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi\sigma x}} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_lnorm](#) gives the expected value.
- [V_lnorm](#) gives the variance.
- [kthmoment_lnorm](#) gives the kth moment.
- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#)

Examples

```
kthmoment_lnorm(k = 2, meanlog = 3, sdlog = 5)
```

<code>kthmoment_pareto</code>	<i>kth moment of the Pareto distribution</i>
-------------------------------	--

Description

kth moment of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
kthmoment_pareto(k, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>k</code>	kth-moment.
<code>shape</code>	shape parameter α , must be positive.
<code>rate</code>	λ rate parameter, must be positive.
<code>scale</code>	alternative parameterization to the rate parameter, $scale = 1 / rate$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha\lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
kthmoment_pareto(k = 4, shape = 5, rate = 2)

# With rate parameter
kthmoment_pareto(k = 4, shape = 5, scale = 0.5)
```

<code>kthmoment_unif</code>	<i>kth moment of the Uniform distribution</i>
-----------------------------	---

Description

kth moment of the Uniform distribution with min a and max b .

Usage

```
kthmoment_unif(k, min = 0, max = 1)
```

Arguments

<code>k</code>	kth-moment.
<code>min, max</code>	lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- `E_unif` gives the expected value.
- `V_unif` gives the variance.
- `kthmoment_unif` gives the kth moment.
- `Etronq_unif` gives the truncated mean.
- `SL_unif` gives the stop-loss.
- `Elim_unif` gives the limited mean.
- `Mexcess_unif` gives the mean excess loss.
- `TVaR_unif` gives the Tail Value-at-Risk.
- `VaR_unif` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: `E_unif()`, `Elim_unif()`, `Etronq_unif()`, `Mexcess_unif()`, `SL_unif()`, `TVaR_unif()`, `V_unif()`, `VaR_unif()`

Examples

```
kthmoment_unif(k = 2, min = 3, max = 4)
```

kthmoment_weibull *kth moment of the Weibull distribution*

Description

kth moment of the Weibull distribution with shape parameter parameter τ and rate parameter β .

Usage

```
kthmoment_weibull(k, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

k	kth-moment.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- [E_weibull](#) gives the expected value.
- [V_weibull](#) gives the variance.
- [kthmoment_weibull](#) gives the kth moment.
- [Etronq_weibull](#) gives the truncated mean.
- [SL_weibull](#) gives the stop-loss.
- [Elim_weibull](#) gives the limited mean.
- [Mexcess_weibull](#) gives the mean excess loss.
- [TVaR_weibull](#) gives the Tail Value-at-Risk.
- [VaR_weibull](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#)

Examples

```
# With scale parameter
kthmoment_weibull(k = 2, shape = 2, scale = 5)

# With rate parameter
kthmoment_weibull(k = 2, shape = 2, rate = 0.2)
```

lawParametersBox	<i>Interactive distribution visualization (server side)</i>
------------------	---

Description

Interactive distribution visualization (server side)

Usage

```
lawParametersBox(input, output, session, law)
```

Arguments

input	input for server side.
output	output for server side.
session	session for server side.
law	Distribution to visualize, one of ...

Value

Server function for the [Distributacul_vis](#) module. Should not be run directly.

lawParametersBoxUI	<i>Interactive distribution visualization (UI side)</i>
--------------------	---

Description

Interactive distribution visualization (UI side)

Usage

lawParametersBoxUI(id)

Arguments

id	id of module
----	--------------

Value

UI function for the [Distributacalcul_vis](#) module. Should not be run directly.

Mexcess_beta	<i>Mean excess loss of the Beta distribution</i>
--------------	--

Description

Mean excess loss of the Beta distribution with shape parameters α and β .

Usage

Mexcess_beta(d, shape1, shape2)

Arguments

d	cut-off value. Recall the the domain is limited between 0 and 1.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
Mexcess_beta(d = .3, shape1 = 4, shape2 = 5)
```

Mexcess_burr

Mean excess loss of the Burr distribution

Description

Mean excess loss of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
Mexcess_burr(d, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
Mexcess_burr(d = 2, rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
Mexcess_burr(d = 2, scale = 0.5, shape1 = 2, shape2 = 5)
```

Mexcess_erlang	<i>Mean excess loss of the Erlang distribution</i>
----------------	--

Description

Mean excess loss of the Erlang distribution with shape parameter n and rate parameter β .

Usage

Mexcess_erlang(d, shape, rate = 1/scale, scale = 1/rate)

Arguments

d	cut-off value.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
Mexcess_erlang(d = 2, shape = 2, scale = 5)

# With rate parameter
Mexcess_erlang(d = 2, shape = 2, rate = 0.2)
```

Mexcess_exp	<i>Mean excess loss of the Exponential distribution</i>
-------------	---

Description

Mean excess loss of the Exponential distribution with rate parameter β .

Usage

```
Mexcess_exp(d, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.

- `kthmoment_exp` gives the kth moment.
- `Etronq_exp` gives the truncated mean.
- `SL_exp` gives the stop-loss.
- `Elim_exp` gives the limited mean.
- `Mexcess_exp` gives the mean excess loss.
- `TVaR_exp` gives the Tail Value-at-Risk.
- `VaR_exp` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: `E_exp()`, `Elim_exp()`, `Etronq_exp()`, `MGF_exp()`, `SL_exp()`, `TVaR_exp()`, `V_exp()`, `VaR_exp()`, `kthmoment_exp()`

Examples

```
# With scale parameter
Mexcess_exp(d = 2, scale = 4)

# With rate parameter
Mexcess_exp(d = 5, rate = 0.25)
```

Mexcess_gamma

Mean excess loss of the Gamma distribution

Description

Mean excess loss of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
Mexcess_gamma(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter α , must be positive integer.
<code>rate</code>	β is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
Mexcess_gamma(d = 2, shape = 3, scale = 4)

# With rate parameter
Mexcess_gamma(d = 2, shape = 3, rate = 0.25)
```

Mexcess_IG

Mean excess loss of the Inverse Gaussian distribution

Description

Truncated mean of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
Mexcess_IG(d, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
Mexcess_IG(d = 2, mean = 2, shape = 5)
```

Mexcess_llogis	<i>Mean excess loss of the Loglogistic distribution</i>
----------------	---

Description

Mean excess loss of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
Mexcess_llogis(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [E_llogis\(\)](#), [Elim_llogis\(\)](#), [Etronq_llogis\(\)](#), [SL_llogis\(\)](#), [TVaR_llogis\(\)](#), [V_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
Mexcess_llogis(d = 2, shape = 3, scale = 5)

# With rate parameter
Mexcess_llogis(d = 2, shape = 3, rate = 0.2)
```

Mexcess_inorm	<i>Mean excess loss of the Lognormal distribution</i>
---------------	---

Description

Mean excess loss of the Lognormal distribution with mean μ and variance σ .

Usage

```
Mexcess_inorm(d, meanlog, sdlog)
```

Arguments

d	cut-off value.
meanlog	location parameter μ .
sdlog	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_inorm](#) gives the expected value.
- [V_inorm](#) gives the variance.
- [kthmoment_inorm](#) gives the kth moment.

- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
Mexcess_lnorm(d = 2, meanlog = 2, sdlog = 5)
```

Mexcess_norm

Mean excess loss of the Normal distribution

Description

Mean excess loss of the Normal distribution with mean μ and variance σ .

Usage

```
Mexcess_norm(d, mean = 0, sd = 1)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `Etronq_norm()`, `MGF_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
Mexcess_norm(d = 2, mean = 2, sd = 5)
```

<code>Mexcess_pareto</code>	<i>Mean excess loss of the Pareto distribution</i>
-----------------------------	--

Description

Mean excess loss of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
Mexcess_pareto(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter α , must be positive.
<code>rate</code>	λ rate parameter, must be positive.
<code>scale</code>	alternative parameterization to the rate parameter, $scale = 1 / rate$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha\lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
Mexcess_pareto(d = 6, shape = 5, rate = 2)

# With rate parameter
Mexcess_pareto(d = 6, shape = 5, scale = 0.5)
```

 Mexcess_unif

Mean excess loss of the Uniform distribution

Description

Mean excess loss of the Uniform distribution with min a and max b .

Usage

```
Mexcess_unif(d, min = 0, max = 1)
```

Arguments

d	cut-off value.
min, max	lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the kth moment.
- [Etronq_unif](#) gives the truncated mean.
- [SL_unif](#) gives the stop-loss.
- [Elim_unif](#) gives the limited mean.
- [Mexcess_unif](#) gives the mean excess loss.
- [TVaR_unif](#) gives the Tail Value-at-Risk.
- [VaR_unif](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [SL_unif\(\)](#), [TVaR_unif\(\)](#), [V_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
Mexcess_unif(d = 2, min = 2, max = 4)
```

Mexcess_weibull	<i>Mean excess loss of the Weibull distribution</i>
-----------------	---

Description

Mean excess loss of the Weibull distribution with shape parameter parameter τ and rate parameter β .

Usage

```
Mexcess_weibull(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- [E_weibull](#) gives the expected value.
- [V_weibull](#) gives the variance.
- [kthmoment_weibull](#) gives the kth moment.
- [Etronq_weibull](#) gives the truncated mean.
- [SL_weibull](#) gives the stop-loss.
- [Elim_weibull](#) gives the limited mean.
- [Mexcess_weibull](#) gives the mean excess loss.
- [TVaR_weibull](#) gives the Tail Value-at-Risk.
- [VaR_weibull](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
Mexcess_weibull(d = 2, shape = 3, scale = 4)

# With rate parameter
Mexcess_weibull(d = 2, shape = 3, rate = 0.25)
```

MGF_beta

Moment Generating Function of the Beta distribution

Description

Moment Generating Function (MGF) of the Beta distribution with shape parameters α and β .

Usage

```
MGF_beta(t, shape1, shape2, k0)
```

Arguments

t	t.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.
k0	point up to which to sum the distribution for the approximation.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
MGF_beta(t = 1, shape1 = 3, shape2 = 5, k0 = 1E2)
```

MGF_binom

Moment Generating Function of the Binomial distribution

Description

Moment Generating Function (MGF) of the Binomial distribution with size n and probability of success p .

Usage

```
MGF_binom(t, size, prob)
```

Arguments

t	t
size	Number of trials (0 or more).
prob	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- [MGF_binom](#) gives the moment generating function (MGF).
- [E_binom](#) gives the expected value.
- [V_binom](#) gives the variance.
- [Etronq_binom](#) gives the truncated mean.
- [TVaR_binom](#) gives the Tail Value-at-Risk.
- [VaR_binom](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: [E_binom\(\)](#), [Etronq_binom\(\)](#), [PGF_binom\(\)](#), [TVaR_binom\(\)](#), [V_binom\(\)](#), [VaR_binom\(\)](#)

Examples

```
MGF_binom(t = 1, size = 3, prob = 0.5)
```

MGF_erlang

Moment Generating Function of the Erlang distribution

Description

Moment Generating Function (MGF) of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
MGF_erlang(t, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

t	t.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
MGF_erlang(t = 1, shape = 3, rate = 5)
```

MGF_exp

*Moment Generating Function of the Exponential distribution***Description**

Moment Generating Function (MGF) of the Exponential distribution with rate parameter β .

Usage

```
MGF_exp(t, rate = 1/scale, scale = 1/rate)
```

Arguments

t	t.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [E_exp\(\)](#), [Elim_exp\(\)](#), [Etronq_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [VaR_exp\(\)](#), [kthmoment_exp\(\)](#)

Examples

```
MGF_exp(t = 1, rate = 5)
```

MGF_gamma

Moment Generating Function of the Gamma distribution

Description

Moment Generating Function (MGF) of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
MGF_gamma(t, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

t	t.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
MGF_gamma(t = 1, shape = 3, rate = 5)
```

MGF_IG

Moment Generating Function of the Inverse Gaussian distribution

Description

Moment Generating Function (MGF) of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
MGF_IG(t, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

t	t
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.

- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
MGF_IG(t = 1, mean = 2, shape = .5)
```

MGF_logarithmic

Moment Generating Function of the Logarithmic distribution

Description

Moment Generating Function (MGF) of the Logarithmic distribution with probability parameter γ .

Usage

```
MGF_logarithmic(t, prob)
```

Arguments

t	t.
prob	probability parameter γ .

Details

The Logarithmic distribution with probability parameter γ has probability mass function

$$Pr(X = k) = \frac{-\gamma^k}{\ln(1 - \gamma)k}$$

, for $k = 0, 1, 2, \dots$, and $\gamma \in (0, 1]$

Value

Function :

- `MGF_logarithmic` gives the moment generating function (MGF).
- `PGF_logarithmic` gives the probability generating function (PGF).
- `E_logarithmic` gives the expected value.
- `V_logarithmic` gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Logarithmic Distribution: `E_logarithmic()`, `PGF_logarithmic()`, `V_logarithmic()`

Examples

```
MGF_logarithmic(t = .2, prob = 0.50)
```

MGF_negbinom

Moment Generating Function of the Negative Binomial distribution

Description

Moment Generating Function (PGF) of the Negative Binomial distribution with parameters r (number of successful trials) and p (probability of success).

Usage

```
MGF_negbinom(
  t,
  size,
  prob = (1/(1 + beta)),
  beta = ((1 - prob)/prob),
  nb_tries = FALSE
)
```

Arguments

<code>t</code>	<code>t</code>
<code>size</code>	Number of successful trials.
<code>prob</code>	Probability of success.
<code>beta</code>	Alternative parameterization of the negative binomial distribution where $\beta = (1 - p) / p$.
<code>nb_tries</code>	logical; if FALSE (default) number of trials until the r th success, otherwise, number of failures until the r th success.

Details

When k is the number of failures until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{r+k-1}{k} (p)^r (1-p)^k$$

for $k \in \{0, 1, \dots\}$

When k is the number of trials until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{k-1}{r-1} (p)^r (1-p)^{k-r}$$

for $k \in \{r, r+1, r+2, \dots\}$

The alternative parameterization of the negative binomial with parameter β , and k being the number of trials, has density:

$$\frac{\Gamma(r+k)}{\Gamma(r)k!} \left(\frac{1}{1+\beta}\right)^r \left(\frac{\beta}{1+\beta}\right)^{k-r}$$

for $k \in \{0, 1, \dots\}$

Value

Function :

- [MGF_negbinom](#) gives the moment generating function (MGF).
- [PGF_negbinom](#) gives the probability generating function (PGF).
- [E_negbinom](#) gives the expected value.
- [V_negbinom](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Negative Binomial Distribution: [E_negbinom\(\)](#), [PGF_negbinom\(\)](#), [V_negbinom\(\)](#)

Examples

```
MGF_negbinom(t = 1, size = 4, prob = 0.5)
```

MGF_norm

*Moment Generating Function of the Normal distribution***Description**

Moment Generating Function (MGF) of the Normal distribution with mean μ and variance σ .

Usage

```
MGF_norm(t, mean = 0, sd = 1)
```

Arguments

t	t.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `Etronq_norm()`, `Mexcess_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
MGF_norm(t = 1, mean = 3, sd = 5)
```

MGF_pois

Moment Generating Function of the Poisson distribution

Description

Moment Generating Function (MGF) of the Poisson distribution with rate parameter λ .

Usage

```
MGF_pois(t, lambda)
```

Arguments

t	t
lambda	Rate parameter λ .

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [E_pois\(\)](#), [Etronq_pois\(\)](#), [PGF_pois\(\)](#), [TVaR_pois\(\)](#), [V_pois\(\)](#)

Examples

```
MGF_pois(t = 1, lambda = 3)
```

perlang

Cumulative density function of the Erlang distribution

Description

Cumulative density function of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
perlang(q, shape, rate = 1/scale, scale = 1/rate, lower.tail = TRUE)
```

Arguments

q	quantile.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
lower.tail	logical; if TRUE (default) probabilities are $\Pr(M \leq k)$, otherwise, $\Pr(M > k)$.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.

- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#)

Examples

```
# With scale parameter
perlang(q = 2, shape = 2, scale = 5)

# With rate parameter
perlang(q = 2, shape = 2, rate = 0.2)
```

PGF_binom

Probability Generating Function of the Binomial distribution

Description

Probability Generating Function (PGF) of the Binomial distribution with size n and probability of success p .

Usage

```
PGF_binom(t, size, prob)
```

Arguments

t	t
size	Number of trials (0 or more).
prob	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- [MGF_binom](#) gives the moment generating function (MGF).
- [E_binom](#) gives the expected value.
- [V_binom](#) gives the variance.
- [Etronq_binom](#) gives the truncated mean.
- [TVaR_binom](#) gives the Tail Value-at-Risk.
- [VaR_binom](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: [E_binom\(\)](#), [Etronq_binom\(\)](#), [MGF_binom\(\)](#), [TVaR_binom\(\)](#), [V_binom\(\)](#), [VaR_binom\(\)](#)

Examples

```
PGF_binom(t = 1, size = 3, prob = 0.5)
```

PGF_logarithmic

Probability Generating Function of the Logarithmic distribution

Description

Probability Generating Function (PGF) of the Logarithmic distribution with probability parameter γ .

Usage

```
PGF_logarithmic(t, prob)
```

Arguments

t	t.
prob	probability parameter γ .

Details

The Logarithmic distribution with probability parameter γ has probability mass function

$$Pr(X = k) = \frac{-\gamma^k}{\ln(1 - \gamma)k}$$

, for $k = 0, 1, 2, \dots$, and $\gamma \in (0, 1]$

Value

Function :

- `MGF_logarithmic` gives the moment generating function (MGF).
- `PGF_logarithmic` gives the probability generating function (PGF).
- `E_logarithmic` gives the expected value.
- `V_logarithmic` gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Logarithmic Distribution: `E_logarithmic()`, `MGF_logarithmic()`, `V_logarithmic()`

Examples

```
PGF_logarithmic(t = .2, prob = 0.50)
```

PGF_negbinom

Probability Generating Function of the Negative Binomial distribution

Description

Probability Generating Function (PGF) of the Negative Binomial distribution with parameters r (number of successful trials) and p (probability of success).

Usage

```
PGF_negbinom(
  t,
  size,
  prob = (1/(1 + beta)),
  beta = ((1 - prob)/prob),
  nb_tries = FALSE
)
```

Arguments

<code>t</code>	<code>t</code>
<code>size</code>	Number of successful trials.
<code>prob</code>	Probability of success.
<code>beta</code>	Alternative parameterization of the negative binomial distribution where $\text{beta} = (1 - p) / p$.
<code>nb_tries</code>	logical; if FALSE (default) number of trials until the r th success, otherwise, number of failures until the r th success.

Details

When k is the number of failures until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{r+k-1}{k} (p)^r (1-p)^k$$

for $k \in \{0, 1, \dots\}$

When k is the number of trials until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{k-1}{r-1} (p)^r (1-p)^{k-r}$$

for $k \in \{r, r+1, r+2, \dots\}$

The alternative parameterization of the negative binomial with parameter β , and k being the number of trials, has density:

$$\frac{\Gamma(r+k)}{\Gamma(r)k!} \left(\frac{1}{1+\beta}\right)^r \left(\frac{\beta}{1+\beta}\right)^{k-r}$$

for $k \in \{0, 1, \dots\}$

Value

Function :

- [MGF_negbinom](#) gives the moment generating function (MGF).
- [PGF_negbinom](#) gives the probability generating function (PGF).
- [E_negbinom](#) gives the expected value.
- [V_negbinom](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Negative Binomial Distribution: [E_negbinom\(\)](#), [MGF_negbinom\(\)](#), [V_negbinom\(\)](#)

Examples

```
PGF_negbinom(t = 5, size = 3, prob = 0.3)
```

Description

Probability Generating Function (PGF) of the Poisson distribution with rate parameter λ .

Usage

```
PGF_pois(t, lambda)
```

Arguments

t	t
lambda	Rate parameter λ .

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [E_pois\(\)](#), [Etronq_pois\(\)](#), [MGF_pois\(\)](#), [TVaR_pois\(\)](#), [V_pois\(\)](#)

Examples

```
PGF_pois(t = 1, lambda = 3)
```

p_BINCOMP

Compound Binomial Distribution

Description

Computes various risk measures (mean, variance, Value-at-Risk (VaR), and Tail Value-at-Risk (TVaR)) for the compound Binomial distribution.

Usage

```
p_BINCOMP(  
  x,  
  size,  
  prob,  
  shape,  
  rate = 1/scale,  
  scale = 1/rate,  
  k0,  
  distr_severity = "Gamma"  
)
```

```
E_BINCOMP(  
  size,  
  prob,  
  shape,  
  rate = 1/scale,  
  scale = 1/rate,  
  distr_severity = "Gamma"  
)
```

```
V_BINCOMP(  
  size,  
  prob,  
  shape,  
  rate = 1/scale,  
  scale = 1/rate,  
  distr_severity = "Gamma"  
)
```

```
VaR_BINCOMP(  
  kap,  
  size,  
  prob,  
  shape,  
  rate = 1/scale,  
  scale = 1/rate,  
  k0,
```

```

    distr_severity = "Gamma"
  )

TVaR_BINCOMP(
  kap,
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  vark,
  k0,
  distr_severity = "Gamma"
)

```

Arguments

x	quantile.
size	Number of trials (0 or more).
prob	Probability of success in each trial.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
k0	point up to which to sum the distribution for the approximation.
distr_severity	Choice of severity distribution. <ul style="list-style-type: none"> • "gamma" (default) • "lognormal" only for the expected value and variance.
kap	probability.
vark	Value-at-Risk (VaR) calculated at the given probability kap.

Details

The compound Binomial Distribution has density

Value

Function :

- [p_BINCOMP](#) gives the cumulative density function.
- [E_BINCOMP](#) gives the expected value.
- [V_BINCOMP](#) gives the variance.
- [TVaR_BINCOMP](#) gives the Tail Value-at-Risk.
- [VaR_BINCOMP](#) gives the Value-at-Risk.

Returned values are approximations for the cumulative density function, TVaR, and VaR.

Examples

```

p_BINCOMP(x = 2, size = 1, prob = 0.2, shape = log(1000) - 0.405,
          rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")

E_BINCOMP(size = 1, prob = 0.2, shape = log(1000) - 0.405, rate = 0.9^2,
          distr_severity = "Lognormale")

V_BINCOMP(size = 1, prob = 0.2, shape = log(1000) - 0.405, rate = 0.9^2,
          distr_severity = "Lognormale")

VaR_BINCOMP(kap = 0.9, size = 1, prob = 0.2, shape = log(1000) - 0.405,
            rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")

var_k_calc <- VaR_BINCOMP(kap = 0.9, size = 1, prob = 0.2, shape = 0.59,
                          rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")
TVaR_BINCOMP(kap = 0.9, size = 1, prob = 0.2, shape = 0.59, rate = 0.9^2,
             var_k = var_k_calc, k0 = 1E2, distr_severity = "Gamma")

```

p_BNCOMP

*Compound Negative Binomial Distribution***Description**

Computes various risk measures (mean, variance, Value-at-Risk (VaR), and Tail Value-at-Risk (TVaR)) for the compound Negative Binomial distribution.

Usage

```

p_BNCOMP(
  x,
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  k0,
  distr_severity = "Gamma"
)

E_BNCOMP(
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  distr_severity = "Gamma"
)

```



```
V_BNCOMP(
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  distr_severity = "Gamma"
)
```

```
VaR_BNCOMP(
  kap,
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  k0,
  distr_severity = "Gamma"
)
```

```
TVaR_BNCOMP(
  kap,
  vark,
  size,
  prob,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  k0,
  distr_severity = "Gamma"
)
```

Arguments

x	quantile.
size	Number of successful trials.
prob	Probability of success in each trial.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.
k0	point up to which to sum the distribution for the approximation.
distr_severity	Choice of severity distribution. <ul style="list-style-type: none"> • "gamma" (default) • "lognormal" only for the expected value and variance.
kap	probability.
vark	Value-at-Risk (VaR) calculated at the given probability kap.

Details

The compound Negative Binomial Distribution has density

Value

Function :

- `p_BNCOMP` gives the cumulative density function.
- `E_BNCOMP` gives the expected value.
- `V_BNCOMP` gives the variance.
- `TVaR_BNCOMP` gives the Tail Value-at-Risk.
- `VaR_BNCOMP` gives the Value-at-Risk.

Returned values are approximations for the cumulative density function, TVaR, and VaR.

Examples

```
p_BNCOMP(x = 2, size = 1, prob = 0.2, shape = log(1000) - 0.405,
         rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")
```

```
E_BNCOMP(size = 4, prob = 0.2, shape = 0, scale = 1,
         distr_severity = "Lognormal")
```

```
V_BNCOMP(size = 1, prob = 0.2, shape = log(1000) - 0.405, rate = 0.9^2,
         distr_severity = "Lognormale")
```

```
VaR_BNCOMP(kap = 0.9, size = 1, prob = 0.2, shape = 0.59,
          rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")
```

```
vark_calc <- VaR_BNCOMP(kap = 0.9, size = 1, prob = 0.2, shape = 0.59,
                      rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")
```

```
TVaR_BNCOMP(kap = 0.9, size = 1, prob = 0.2, shape = 0.59, rate = 0.9^2,
           vark = vark_calc, k0 = 1E2, distr_severity = "Gamma")
```

p_pareto

Cumulative density function of the Pareto distribution

Description

Cumulative density function of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
p_pareto(q, shape, rate = 1/scale, scale = 1/rate, lower.tail = TRUE)
```

Arguments

q	quantile.
shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.
lower.tail	logical; if <code>TRUE</code> (default) probabilities are $\Pr(M \leq k)$, otherwise, $\Pr(M > k)$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- `d_pareto` gives the density function.
- `p_pareto` gives the cumulative density function.
- `E_pareto` gives the expected value.
- `V_pareto` gives the variance.
- `kthmoment_pareto` gives the kth moment.
- `Etronq_pareto` gives the truncated mean.
- `SL_pareto` gives the stop-loss.
- `Elim_pareto` gives the limited mean.
- `Mexcess_pareto` gives the mean excess loss.
- `TVaR_pareto` gives the Tail Value-at-Risk.
- `VaR_pareto` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: `E_pareto()`, `Elim_pareto()`, `Etronq_pareto()`, `Mexcess_pareto()`, `SL_pareto()`, `TVaR_pareto()`, `V_pareto()`, `VaR_pareto()`, `d_pareto()`, `kthmoment_pareto()`

Examples

```
# With scale parameter
p_pareto(q = 2, shape = 2, scale = 5)

# With rate parameter
p_pareto(q = 2, shape = 2, rate = 5)

# Survival function
p_pareto(q = 2, shape = 2, rate = 5, lower.tail = FALSE)
```

p_PCOMP

Compound Poisson Distribution

Description

Computes various risk measures (mean, variance, Value-at-Risk (VaR), and Tail Value-at-Risk (TVaR)) for the compound Poisson distribution.

Usage

```
p_PCOMP(
  x,
  lambda,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  k0,
  distr_severity = "Gamma"
)

E_PCOMP(
  lambda,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  distr_severity = "Gamma"
)

V_PCOMP(
  lambda,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  distr_severity = "Gamma"
)
```

```

VaR_PCOMP(
  kap,
  lambda,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  k0,
  distr_severity = "Gamma"
)

```

```

TVaR_PCOMP(
  kap,
  lambda,
  shape,
  rate = 1/scale,
  scale = 1/rate,
  vark,
  k0,
  distr_severity = "Gamma"
)

```

Arguments

x	quantile.
lambda	Rate parameter λ .
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.
k0	point up to which to sum the distribution for the approximation.
distr_severity	Choice of severity distribution. <ul style="list-style-type: none"> • "gamma" (default) • "lognormal" only for the expected value and variance.
kap	probability.
vark	Value-at-Risk (VaR) calculated at the given probability kap.

Details

The compound Binomial Distribution with parameters ... has density ...

Value

Function :

- [p_PCOMP](#) gives the cumulative density function.
- [E_PCOMP](#) gives the expected value.

- `V_PCOMP` gives the variance.
- `TVaR_PCOMP` gives the Tail Value-at-Risk.
- `VaR_PCOMP` gives the Value-at-Risk.

Returned values are approximations for the cumulative density function, TVaR, and VaR.

Examples

```
p_PCOMP(x = 2, lambda = 2, shape = log(1000) - 0.405,
        rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")

E_PCOMP(lambda = 2, shape = log(1000) - 0.405, rate = 0.9^2,
        distr_severity = "Lognormale")

V_PCOMP(lambda = 2, shape = log(1000) - 0.405, rate = 0.9^2,
        distr_severity = "Lognormale")

VaR_PCOMP(kap = 0.9, lambda = 2, shape = log(1000) - 0.405,
        rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")

vark_calc <- VaR_PCOMP(kap = 0.9, lambda = 2, shape = 0.59,
        rate = 0.9^2, k0 = 1E2, distr_severity = "Gamma")

TVaR_PCOMP(kap = 0.9, lambda = 2, shape = 0.59, rate = 0.9^2,
        vark = vark_calc, k0 = 1E2, distr_severity = "Gamma")
```

p_unifD	<i>Cumulative probability mass function of the (discrete) Uniform distribution</i>
---------	--

Description

Cumulative probability mass function of the (discrete) Uniform distribution with min a and max b .

Usage

```
p_unifD(q, min = 0, max = 1)
```

Arguments

q	quantile.
min, max	lower and upper limits of the distribution. Must be finite.

Details

The (discrete) uniform distribution with min and max parameters a and b respectively has density:

$$\Pr(X = x) = \frac{1}{b - a + 1}$$

for $x \in \{a, a + 1, \dots, b - 1, b\}$.

Value

Function :

- `E_unifD` gives the expected value.
- `V_unifD` gives the variance.
- `d_unifD` gives the density function.
- `D_unifD` gives the cumulative density function.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Discrete Uniform Distribution: `E_unifD()`, `V_unifD()`, `d_unifD()`

Examples

```
# With scale parameter
p_unifD(q = 2, min = 2, max = 5)
```

SL_beta

Stop-loss of the Beta distribution

Description

Stop-loss of the Beta distribution with shape parameters α and β .

Usage

```
SL_beta(d, shape1, shape2)
```

Arguments

<code>d</code>	cut-off value. Recall the the domain is limited between 0 and 1.
<code>shape1</code>	shape parameter α , must be positive.
<code>shape2</code>	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.
- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [TVaR_beta\(\)](#), [V_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
SL_beta(d = 0.3, shape1 = 4, shape2 = 5)
```

SL_burr

Stop-loss of the Burr distribution

Description

Stop-loss of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
SL_burr(d, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
SL_burr(d = 2, rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
SL_burr(d = 2, scale = 0.5, shape1 = 2, shape2 = 5)
```

 SL_erlang

 Stop-loss of the Erlang distribution

Description

Stop-loss of the Erlang distribution with shape parameter n and rate parameter β .

Usage

SL_erlang(d, shape, rate = 1/scale, scale = 1/rate)

Arguments

d	cut-off value.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
SL_erlang(d = 2, shape = 2, scale = 5)

# With rate parameter
SL_erlang(d = 2, shape = 2, rate = 0.2)
```

SL_exp

Stop-loss of the Exponential distribution

Description

Stop-loss of the Exponential distribution with rate parameter β .

Usage

```
SL_exp(d, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.

- `kthmoment_exp` gives the kth moment.
- `Etronq_exp` gives the truncated mean.
- `SL_exp` gives the stop-loss.
- `Elim_exp` gives the limited mean.
- `Mexcess_exp` gives the mean excess loss.
- `TVaR_exp` gives the Tail Value-at-Risk.
- `VaR_exp` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: `E_exp()`, `Elim_exp()`, `Etronq_exp()`, `MGF_exp()`, `Mexcess_exp()`, `TVaR_exp()`, `V_exp()`, `VaR_exp()`, `kthmoment_exp()`

Examples

```
# With scale parameter
SL_exp(d = 2, scale = 4)

# With rate parameter
SL_exp(d = 2, rate = 0.25)
```

SL_gamma

Stop-loss of the Gamma distribution

Description

Stop-loss of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
SL_gamma(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter α , must be positive integer.
<code>rate</code>	β is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
SL_gamma(d = 2, shape = 3, scale = 4)

# With rate parameter
SL_gamma(d = 2, shape = 3, rate = 0.25)
```

SL_IG

*Stop-loss of the Inverse Gaussian distribution***Description**

Stop-loss of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
SL_IG(d, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
SL_IG(d = 2, mean = 2, shape = 5)
```

SL_llogis	<i>Stop-loss of the Loglogistic distribution</i>
-----------	--

Description

Stop-loss of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
SL_llogis(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [E_llogis\(\)](#), [Elim_llogis\(\)](#), [Etronq_llogis\(\)](#), [Mexcess_llogis\(\)](#), [TVaR_llogis\(\)](#), [V_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
SL_llogis(d = 2, shape = 3, scale = 5)

# With rate parameter
SL_llogis(d = 2, shape = 3, rate = 0.2)
```

SL_Inorm

Stop-loss of the Lognormal distribution

Description

Stop-loss of the Lognormal distribution with mean μ and variance σ .

Usage

```
SL_Inorm(d, meanlog, sdlog)
```

Arguments

d	cut-off value.
meanlog	location parameter μ .
sdlog	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_Inorm](#) gives the expected value.
- [V_Inorm](#) gives the variance.
- [kthmoment_Inorm](#) gives the kth moment.

- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
SL_lnorm(d = 2, meanlog = 2, sdlog = 5)
```

SL_norm

Stop-loss of the Normal distribution

Description

Stop-loss of the Normal distribution with mean μ and variance σ .

Usage

```
SL_norm(d, mean = 0, sd = 1)
```

Arguments

d	cut-off value.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `Etronq_norm()`, `MGF_norm()`, `Mexcess_norm()`, `TVaR_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
SL_norm(d = 2, mean = 2, sd = 5)
```

SL_pareto

Stop-loss of the Pareto distribution

Description

Stop-loss of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
SL_pareto(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>d</code>	cut-off value.
<code>shape</code>	shape parameter α , must be positive.
<code>rate</code>	λ rate parameter, must be positive.
<code>scale</code>	alternative parameterization to the rate parameter, $scale = 1 / rate$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha\lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
SL_pareto(d = 2, shape = 5, rate = 2)

# With rate parameter
SL_pareto(d = 2, shape = 5, scale = 0.5)
```

SL_unif

*Stop-loss of the Uniform distribution***Description**

Stop-loss of the Uniform distribution with min a and max b .

Usage

```
SL_unif(d, min = 0, max = 1)
```

Arguments

d cut-off value.
 min, max lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the kth moment.
- [Etronq_unif](#) gives the truncated mean.
- [SL_unif](#) gives the stop-loss.
- [Elim_unif](#) gives the limited mean.
- [Mexcess_unif](#) gives the mean excess loss.
- [TVaR_unif](#) gives the Tail Value-at-Risk.
- [VaR_unif](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [Mexcess_unif\(\)](#), [TVaR_unif\(\)](#), [V_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
SL_unif(d = 3, min = 2, max = 4)
```

SL_weibull

Stop-loss of the Weibull distribution

Description

Stop-loss of the Weibull distribution with shape parameter parameter τ and rate parameter β .

Usage

```
SL_weibull(d, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

d	cut-off value.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- [E_weibull](#) gives the expected value.
- [V_weibull](#) gives the variance.
- [kthmoment_weibull](#) gives the kth moment.
- [Etronq_weibull](#) gives the truncated mean.
- [SL_weibull](#) gives the stop-loss.
- [Elim_weibull](#) gives the limited mean.
- [Mexcess_weibull](#) gives the mean excess loss.
- [TVaR_weibull](#) gives the Tail Value-at-Risk.
- [VaR_weibull](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
SL_weibull(d = 2, shape = 3, scale = 4)

# With rate parameter
SL_weibull(d = 2, shape = 3, rate = 0.25)
```

TVaR_beta

Tail Value-at-Risk of the Beta distribution

Description

Tail Value-at-Risk of the Beta distribution with shape parameters α and β .

Usage

```
TVaR_beta(kap, shape1, shape2)
```

Arguments

kap	probability.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.

- `kthmoment_beta` gives the k th moment.
- `Etronq_beta` gives the truncated mean.
- `SL_beta` gives the stop-loss.
- `Elim_beta` gives the limited mean.
- `Mexcess_beta` gives the mean excess loss.
- `TVaR_beta` gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: `E_beta()`, `Elim_beta()`, `Etronq_beta()`, `MGF_beta()`, `Mexcess_beta()`, `SL_beta()`, `V_beta()`, `Var_beta()`, `kthmoment_beta()`

Examples

```
TVaR_beta(kap = .99, shape1 = 4, shape2 = 5)
```

TVaR_binom

Tail Value-at-Risk of the Binomial distribution

Description

Tail Value-at-Risk of the Binomial distribution with size n and probability of success p .

Usage

```
TVaR_binom(kap, size, prob)
```

Arguments

<code>kap</code>	probability.
<code>size</code>	Number of trials (0 or more).
<code>prob</code>	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- `MGF_binom` gives the moment generating function (MGF).
- `E_binom` gives the expected value.
- `V_binom` gives the variance.
- `Etronq_binom` gives the truncated mean.
- `TVaR_binom` gives the Tail Value-at-Risk.
- `VaR_binom` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: `E_binom()`, `Etronq_binom()`, `MGF_binom()`, `PGF_binom()`, `V_binom()`, `VaR_binom()`

Examples

```
TVaR_binom(kap = 0.8, size = 5, prob = 0.2)
```

TVaR_burr

Tail Value-at-Risk of the Burr distribution

Description

Tail Value-at-Risk of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
TVaR_burr(kap, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [V_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
TVaR_burr(kap = .8, rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
TVaR_burr(kap = .8, scale = 0.5, shape1 = 2, shape2 = 5)
```

TVaR_erlang

*Tail Value-at-Risk of the Erlang distribution***Description**

Tail Value-at-Risk of the Erlang distribution with shape parameter n and rate parameter β .

Usage

TVaR_erlang(kap, shape, rate = 1/scale, scale = 1/rate)

Arguments

kap	probability.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [V_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
TVaR_erlang(kap = .2, shape = 3, scale = 4)

# With rate parameter
TVaR_erlang(kap = .2, shape = 3, rate = 0.25)
```

TVaR_exp

*Tail Value-at-Risk of the Exponential distribution***Description**

Tail Value-at-Risk of the Exponential distribution with rate parameter β .

Usage

```
TVaR_exp(kap, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.

- `kthmoment_exp` gives the kth moment.
- `Etronq_exp` gives the truncated mean.
- `SL_exp` gives the stop-loss.
- `Elim_exp` gives the limited mean.
- `Mexcess_exp` gives the mean excess loss.
- `TVaR_exp` gives the Tail Value-at-Risk.
- `VaR_exp` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: `E_exp()`, `Elim_exp()`, `Etronq_exp()`, `MGF_exp()`, `Mexcess_exp()`, `SL_exp()`, `V_exp()`, `VaR_exp()`, `kthmoment_exp()`

Examples

```
# With scale parameter
TVaR_exp(kap = .99, scale = 4)

# With rate parameter
TVaR_exp(kap = .99, rate = 0.25)
```

TVaR_gamma

Tail Value-at-Risk of the Gamma distribution

Description

Tail Value-at-Risk of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
TVaR_gamma(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>kap</code>	probability.
<code>shape</code>	shape parameter α , must be positive integer.
<code>rate</code>	β is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [V_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
TVaR_gamma(kap = .2, shape = 3, scale = 4)

# With rate parameter
TVaR_gamma(kap = .2, shape = 3, rate = 0.25)
```

TVaR_IG

*Tail Value-at-Risk of the Inverse Gaussian distribution***Description**

Tail Value-at-Risk of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

```
TVaR_IG(kap, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)
```

Arguments

kap	probability.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [V_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
TVaR_IG(kap = 0.99, mean = 2, shape = 5)
```

TVaR_llogis	<i>Tail Value-at-Risk of the Loglogistic distribution</i>
-------------	---

Description

Tail Value-at-Risk of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
TVaR_llogis(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [E_llogis\(\)](#), [Elim_llogis\(\)](#), [Etronq_llogis\(\)](#), [Mexcess_llogis\(\)](#), [SL_llogis\(\)](#), [V_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
TVaR_llogis(kap = 0.8, shape = 3, scale = 5)

# With rate parameter
TVaR_llogis(kap = 0.8, shape = 3, rate = 0.2)
```

TVaR_Inorm

Tail Value-at-Risk of the Lognormal distribution

Description

Tail Value-at-Risk of the Lognormal distribution with mean μ and variance σ .

Usage

```
TVaR_Inorm(kap, meanlog, sdlog)
```

Arguments

kap	probability.
meanlog	location parameter μ .
sdlog	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_Inorm](#) gives the expected value.
- [V_Inorm](#) gives the variance.
- [kthmoment_Inorm](#) gives the kth moment.

- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [V_lnorm\(\)](#), [VaR_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
TVaR_lnorm(kap = 0.8, meanlog = 2, sdlog = 5)
```

TVaR_norm

Tail Value-at-Risk of the Normal distribution

Description

Tail Value-at-Risk of the Normal distribution with mean μ and variance σ .

Usage

```
TVaR_norm(kap, mean = 0, sd = 1)
```

Arguments

kap	probability.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `Etronq_norm()`, `MGF_norm()`, `Mexcess_norm()`, `SL_norm()`, `V_norm()`, `VaR_norm()`

Examples

```
TVaR_norm(kap = 0.8, mean = 2, sd = 5)
```

TVaR_pareto

Tail Value-at-Risk of the Pareto distribution

Description

Tail Value-at-Risk of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
TVaR_pareto(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>kap</code>	probability.
<code>shape</code>	shape parameter α , must be positive.
<code>rate</code>	λ rate parameter, must be positive.
<code>scale</code>	alternative parameterization to the rate parameter, $scale = 1 / rate$.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha\lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [V_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
TVaR_pareto(kap = .99, shape = 5, rate = 2)

# With rate parameter
TVaR_pareto(kap = .99, shape = 5, scale = 0.5)
```

TVaR_pois

*Tail Value-at-Risk of the Poisson distribution***Description**

Tail Value-at-Risk of the Poisson distribution with rate parameter λ .

Usage

```
TVaR_pois(kap, lambda, k0)
```

Arguments

kap	probability.
lambda	Rate parameter λ .
k0	point up to which to sum the distribution to approximate the expected value.

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [E_pois\(\)](#), [Etronq_pois\(\)](#), [MGF_pois\(\)](#), [PGF_pois\(\)](#), [V_pois\(\)](#)

Examples

```
TVaR_pois(kap = 0.8, lambda = 3, k0 = 2E2)
```

TVaR_unif

*Tail Value-at-Risk of the Uniform distribution***Description**

Tail Value-at-Risk of the Uniform distribution with min a and max b .

Usage

```
TVaR_unif(kap, min = 0, max = 1)
```

Arguments

kap	probability.
min, max	lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the kth moment.
- [Etronq_unif](#) gives the truncated mean.
- [SL_unif](#) gives the stop-loss.
- [Elim_unif](#) gives the limited mean.
- [Mexcess_unif](#) gives the mean excess loss.
- [TVaR_unif](#) gives the Tail Value-at-Risk.
- [VaR_unif](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [Mexcess_unif\(\)](#), [SL_unif\(\)](#), [V_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
TVaR_unif(kap = .99, min = 3, max = 4)
```

TVaR_weibull	<i>Tail Value-at-Risk of the Weibull Distribution</i>
--------------	---

Description

Tail Value-at-Risk of the Weibull distribution with shape parameter parameter τ and rate parameter β .

Usage

```
TVaR_weibull(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- `E_weibull` gives the expected value.
- `V_weibull` gives the variance.
- `kthmoment_weibull` gives the kth moment.
- `Etronq_weibull` gives the truncated mean.
- `SL_weibull` gives the stop-loss.
- `Elim_weibull` gives the limited mean.
- `Mexcess_weibull` gives the mean excess loss.
- `TVaR_weibull` gives the Tail Value-at-Risk.
- `VaR_weibull` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [V_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
TVaR_weibull(kap = .2, shape = 3, scale = 4)

# With rate parameter
TVaR_weibull(kap = .2, shape = 3, rate = 0.25)
```

VaR_beta

*Value-at-Risk of the Beta distribution***Description**

Value-at-Risk of the Beta distribution with shape parameters α and β . Wrapper of `qbeta`.

Usage

```
VaR_beta(kap, shape1, shape2)
```

Arguments

kap	probability.
shape1	shape parameter α , must be positive.
shape2	shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.

- `kthmoment_beta` gives the kth moment.
- `Etronq_beta` gives the truncated mean.
- `SL_beta` gives the stop-loss.
- `Elim_beta` gives the limited mean.
- `Mexcess_beta` gives the mean excess loss.
- `TVaR_beta` gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

Note

Function `VaR_beta` is a wrapper for the `qbeta` function from the stats package.

See Also

Other Beta Distribution: `E_beta()`, `Elim_beta()`, `Etronq_beta()`, `MGF_beta()`, `Mexcess_beta()`, `SL_beta()`, `TVaR_beta()`, `V_beta()`, `kthmoment_beta()`

Examples

```
VaR_beta(kap = .99, shape1 = 4, shape2 = 5)
```

VaR_binom

Value-at-Risk of the Binomial distribution

Description

Value-at-Risk of the Binomial distribution with size n and probability of success p .

Usage

```
VaR_binom(kap, size, prob)
```

Arguments

<code>kap</code>	probability.
<code>size</code>	Number of trials (0 or more).
<code>prob</code>	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- `MGF_binom` gives the moment generating function (MGF).
- `E_binom` gives the expected value.
- `V_binom` gives the variance.
- `Etronq_binom` gives the truncated mean.
- `TVaR_binom` gives the Tail Value-at-Risk.
- `VaR_binom` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

Note

Function `VaR_binom` is a wrapper for the `qbinom` function from the `stats` package.

See Also

Other Binomial Distribution: `E_binom()`, `Etronq_binom()`, `MGF_binom()`, `PGF_binom()`, `TVaR_binom()`, `V_binom()`

Examples

```
VaR_binom(kap = 0.8, size = 5, prob = 0.2)
```

VaR_burr

Value-at-Risk of the Burr distribution

Description

Value-at-Risk of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
VaR_burr(kap, shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

<code>kap</code>	probability.
<code>shape1</code>	first shape parameter α , must be positive integer.
<code>shape2</code>	second shape parameter τ , must be positive integer.
<code>rate</code>	λ is the rate parameter, must be positive.
<code>scale</code>	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [V_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
VaR_burr(kap = .8, rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
VaR_burr(kap = .8, scale = 0.5, shape1 = 2, shape2 = 5)
```

VaR_erlang *Value-at-Risk of the Erlang distribution*

Description

Value-at-Risk of the Erlang distribution with shape parameter n and rate parameter β .

Usage

VaR_erlang(kap, shape, rate = 1/scale, scale = 1/rate)

Arguments

kap	probability.
shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- [MGF_erlang](#) gives the moment generating function (MGF).
- [derlang](#) gives the density function.
- [perlang](#) gives the cumulative density function.
- [E_erlang](#) gives the expected value.
- [V_erlang](#) gives the variance.
- [kthmoment_erlang](#) gives the kth moment.
- [Etronq_erlang](#) gives the truncated mean.
- [SL_erlang](#) gives the stop-loss.
- [Elim_erlang](#) gives the limited mean.
- [Mexcess_erlang](#) gives the mean excess loss.
- [TVaR_erlang](#) gives the Tail Value-at-Risk.
- [VaR_erlang](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

Note

Wrapper of qgamma from package stats.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [V_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
VaR_erlang(kap = .2, shape = 3, scale = 4)

# With rate parameter
VaR_erlang(kap = .2, shape = 3, rate = 0.25)
```

 VaR_exp

Value-at-Risk of the Exponential distribution

Description

Value-at-Risk of the Exponential distribution with rate parameter β .

Usage

```
VaR_exp(kap, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.
- [Etronq_exp](#) gives the truncated mean.
- [SL_exp](#) gives the stop-loss.
- [Elim_exp](#) gives the limited mean.
- [Mexcess_exp](#) gives the mean excess loss.
- [TVaR_exp](#) gives the Tail Value-at-Risk.
- [VaR_exp](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: [E_exp\(\)](#), [Elim_exp\(\)](#), [Etronq_exp\(\)](#), [MGF_exp\(\)](#), [Mexcess_exp\(\)](#), [SL_exp\(\)](#), [TVaR_exp\(\)](#), [V_exp\(\)](#), [kthmoment_exp\(\)](#)

Examples

```
# With scale parameter
VaR_exp(kap = .99, scale = 4)

# With rate parameter
VaR_exp(kap = .99, rate = 0.25)
```

VaR_gamma

Value-at-Risk of the Gamma distribution

Description

Value-at-Risk of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
VaR_gamma(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

Note

Wrapper of `qgamma` from package `stats`.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [V_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
VaR_gamma(kap = .2, shape = 3, scale = 4)

# With rate parameter
VaR_gamma(kap = .2, shape = 3, rate = 0.25)
```

VaR_IG *Value-at-Risk of the Inverse Gaussian distribution*

Description

Value-at-Risk of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

VaR_IG(kap, mean, shape = dispersion * mean^2, dispersion = shape/mean^2)

Arguments

kap	probability.
mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

Note

Function VaR_IG is a wrapper for the qinvgauss function from the statmod package.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [V_IG\(\)](#)

Examples

```
VaR_IG(kap = 0.99, mean = 2, shape = 5)
```

VaR_llogis

Value-at-Risk of the Loglogistic distribution

Description

Value-at-Risk of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
VaR_llogis(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.

- `Elim_llogis` gives the limited mean.
- `Mexcess_llogis` gives the mean excess loss.
- `TVaR_llogis` gives the Tail Value-at-Risk.
- `VaR_llogis` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: `E_llogis()`, `Elim_llogis()`, `Etronq_llogis()`, `Mexcess_llogis()`, `SL_llogis()`, `TVaR_llogis()`, `V_llogis()`, `kthmoment_llogis()`

Examples

```
# With scale parameter
VaR_llogis(kap = 0.8, shape = 3, scale = 5)

# With rate parameter
VaR_llogis(kap = 0.8, shape = 3, rate = 0.2)
```

VaR_Inorm

Value-at-Risk of the Lognormal distribution

Description

Value-at-Risk of the Lognormal distribution with mean μ and variance σ . Wrapper of `qlnorm`.

Usage

```
VaR_Inorm(kap, meanlog, sdlog)
```

Arguments

<code>kap</code>	probability.
<code>meanlog</code>	location parameter μ .
<code>sdlog</code>	standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi\sigma x}} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- [E_lnorm](#) gives the expected value.
- [V_lnorm](#) gives the variance.
- [kthmoment_lnorm](#) gives the kth moment.
- [Etronq_lnorm](#) gives the truncated mean.
- [SL_lnorm](#) gives the stop-loss.
- [Elim_lnorm](#) gives the limited mean.
- [Mexcess_lnorm](#) gives the mean excess loss.
- [TVaR_lnorm](#) gives the Tail Value-at-Risk.
- [VaR_lnorm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: [E_lnorm\(\)](#), [Elim_lnorm\(\)](#), [Etronq_lnorm\(\)](#), [Mexcess_lnorm\(\)](#), [SL_lnorm\(\)](#), [TVaR_lnorm\(\)](#), [V_lnorm\(\)](#), [kthmoment_lnorm\(\)](#)

Examples

```
VaR_lnorm(kap = 0.8, meanlog = 3, sdlog = 5)
```

VaR_norm

Value-at-Risk of the Normal distribution

Description

Value-at-Risk of the Normal distribution with mean μ and variance σ . Wrapper of qnorm.

Usage

```
VaR_norm(kap, mean = 0, sd = 1)
```

Arguments

kap	probability.
mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}, \mu \in \mathcal{R}, \sigma > 0$.

Value

Function :

- `MGF_norm` gives the moment generating function (MGF).
- `E_norm` gives the expected value.
- `V_norm` gives the variance.
- `Etronq_norm` gives the truncated mean.
- `SL_norm` gives the stop-loss.
- `Elim_norm` gives the limited mean.
- `Mexcess_norm` gives the mean excess loss.
- `TVaR_norm` gives the Tail Value-at-Risk.
- `VaR_norm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: `E_norm()`, `Elim_norm()`, `Etronq_norm()`, `MGF_norm()`, `Mexcess_norm()`, `SL_norm()`, `TVaR_norm()`, `V_norm()`

Examples

```
VaR_norm(kap = 0.8, mean = 3, sd = 5)
```

VaR_pareto

Value-at-Risk of the Pareto distribution

Description

Value-at-Risk of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
VaR_pareto(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [V_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
VaR_pareto(kap = .99, shape = 5, rate = 2)

# With rate parameter
VaR_pareto(kap = .99, shape = 5, scale = 0.5)
```

VaR_unif

*Value-at-Risk of the Uniform distribution***Description**

Value-at-Risk of the Uniform distribution with min a and max b .

Usage

```
VaR_unif(kap, min = 0, max = 1)
```

Arguments

kap	probability.
min, max	lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the kth moment.
- [Etronq_unif](#) gives the truncated mean.
- [SL_unif](#) gives the stop-loss.
- [Elim_unif](#) gives the limited mean.
- [Mexcess_unif](#) gives the mean excess loss.
- [TVaR_unif](#) gives the Tail Value-at-Risk.
- [VaR_unif](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [Mexcess_unif\(\)](#), [SL_unif\(\)](#), [TVaR_unif\(\)](#), [V_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
VaR_unif(kap = .99, min = 3, max = 4)
```

VaR_weibull

Value-at-Risk of the Weibull distribution

Description

Value-at-Risk of the Weibull distribution with shape parameter τ and rate parameter β .

Usage

```
VaR_weibull(kap, shape, rate = 1/scale, scale = 1/rate)
```

Arguments

kap	probability.
shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- `E_weibull` gives the expected value.
- `V_weibull` gives the variance.
- `kthmoment_weibull` gives the kth moment.
- `Etronq_weibull` gives the truncated mean.
- `SL_weibull` gives the stop-loss.
- `Elim_weibull` gives the limited mean.
- `Mexcess_weibull` gives the mean excess loss.
- `TVaR_weibull` gives the Tail Value-at-Risk.
- `VaR_weibull` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [V_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
VaR_weibull(kap = .2, shape = 3, scale = 4)

# With rate parameter
VaR_weibull(kap = .2, shape = 3, rate = 0.25)
```

V_beta

Variance of the Beta distribution

Description

Variance of the Beta distribution with shape parameters α and β .

Usage

```
V_beta(shape1, shape2)
```

Arguments

shape1 shape parameter α , must be positive.
shape2 shape parameter β , must be positive.

Details

The Beta distribution with shape parameters α and β has density:

$$f(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$$

for $x \in [0, 1]$, $\alpha, \beta > 0$.

Value

Function :

- [MGF_beta](#) gives the moment generating function (MGF).
- [E_beta](#) gives the expected value.
- [V_beta](#) gives the variance.
- [kthmoment_beta](#) gives the kth moment.

- [Etronq_beta](#) gives the truncated mean.
- [SL_beta](#) gives the stop-loss.
- [Elim_beta](#) gives the limited mean.
- [Mexcess_beta](#) gives the mean excess loss.
- [TVaR_beta](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Beta Distribution: [E_beta\(\)](#), [Elim_beta\(\)](#), [Etronq_beta\(\)](#), [MGF_beta\(\)](#), [Mexcess_beta\(\)](#), [SL_beta\(\)](#), [TVaR_beta\(\)](#), [VaR_beta\(\)](#), [kthmoment_beta\(\)](#)

Examples

```
V_beta(shape1 = 4, shape2 = 5)
```

V_binom

Variance of the Binomial distribution

Description

Variance of the Binomial distribution with size n and probability of success p .

Usage

```
V_binom(size, prob)
```

Arguments

size	Number of trials (0 or more).
prob	Probability of success on each trial.

Details

The Binomial distribution with probability of success p for n trials has probability mass function :

$$Pr(X = k) = \binom{n}{k} p^k (1 - p)^{n-k}$$

for $k = 0, 1, 2, \dots, n$, $p \in [0, 1]$, and $n > 0$

Value

Function :

- [MGF_binom](#) gives the moment generating function (MGF).
- [E_binom](#) gives the expected value.
- [V_binom](#) gives the variance.
- [Etronq_binom](#) gives the truncated mean.
- [TVaR_binom](#) gives the Tail Value-at-Risk.
- [VaR_binom](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Binomial Distribution: [E_binom\(\)](#), [Etronq_binom\(\)](#), [MGF_binom\(\)](#), [PGF_binom\(\)](#), [TVaR_binom\(\)](#), [VaR_binom\(\)](#)

Examples

```
V_binom(size = 3, prob = 0.5)
```

V_burr

Variance of the Burr distribution

Description

Variance of the Burr distribution with shape parameters α (shape1) and τ (shape2) as well as rate parameter λ .

Usage

```
V_burr(shape1, shape2, rate = 1/scale, scale = 1/rate)
```

Arguments

shape1	first shape parameter α , must be positive integer.
shape2	second shape parameter τ , must be positive integer.
rate	λ is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Burr distribution with rate parameter λ as well as shape parameters α and τ has density:

$$f(x) = \frac{\alpha\tau\lambda^\alpha x^{\tau-1}}{(\lambda + x^\tau)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \tau, \lambda > 0$.

Value

Function :

- [E_burr](#) gives the expected value.
- [V_burr](#) gives the variance.
- [kthmoment_burr](#) gives the kth moment.
- [Etronq_burr](#) gives the truncated mean.
- [SL_burr](#) gives the stop-loss.
- [Elim_burr](#) gives the limited mean.
- [Mexcess_burr](#) gives the mean excess loss.
- [TVaR_burr](#) gives the Tail Value-at-Risk.
- [VaR_burr](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Burr Distribution: [E_burr\(\)](#), [Elim_burr\(\)](#), [Etronq_burr\(\)](#), [Mexcess_burr\(\)](#), [SL_burr\(\)](#), [TVaR_burr\(\)](#), [VaR_burr\(\)](#), [kthmoment_burr\(\)](#)

Examples

```
# With scale parameter
V_burr(rate = 2, shape1 = 2, shape2 = 5)

# With rate parameter
V_burr(scale = 0.5, shape1 = 2, shape2 = 5)
```

V_erlang

*Variance of the Erlang distribution***Description**

Variance of the Erlang distribution with shape parameter n and rate parameter β .

Usage

```
V_erlang(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter n , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Erlang distribution with shape parameter n and rate parameter β has density:

$$f(x) = \frac{\beta^n}{\Gamma(n)} x^{n-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $n \in \mathcal{N}^+$

Value

Function :

- `MGF_erlang` gives the moment generating function (MGF).
- `derlang` gives the density function.
- `perlang` gives the cumulative density function.
- `E_erlang` gives the expected value.
- `V_erlang` gives the variance.
- `kthmoment_erlang` gives the kth moment.
- `Etronq_erlang` gives the truncated mean.
- `SL_erlang` gives the stop-loss.
- `Elim_erlang` gives the limited mean.
- `Mexcess_erlang` gives the mean excess loss.
- `TVaR_erlang` gives the Tail Value-at-Risk.
- `VaR_erlang` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Erlang Distribution: [E_erlang\(\)](#), [Elim_erlang\(\)](#), [Etronq_erlang\(\)](#), [MGF_erlang\(\)](#), [Mexcess_erlang\(\)](#), [SL_erlang\(\)](#), [TVaR_erlang\(\)](#), [VaR_erlang\(\)](#), [derlang\(\)](#), [kthmoment_erlang\(\)](#), [perlang\(\)](#)

Examples

```
# With scale parameter
V_erlang(shape = 2, scale = 5)

# With rate parameter
V_erlang(shape = 2, rate = 0.2)
```

V_exp

Variance of the Exponential distribution

Description

Variance of the Exponential distribution with rate parameter β .

Usage

```
V_exp(rate = 1/scale, scale = 1/rate)
```

Arguments

rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Exponential distribution with rate parameter β has density:

$$f(x) = \frac{1}{\beta} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta > 0$.

Value

Function :

- [MGF_exp](#) gives the moment generating function (MGF).
- [E_exp](#) gives the expected value.
- [V_exp](#) gives the variance.
- [kthmoment_exp](#) gives the kth moment.

- `Etronq_exp` gives the truncated mean.
- `SL_exp` gives the stop-loss.
- `Elim_exp` gives the limited mean.
- `Mexcess_exp` gives the mean excess loss.
- `TVaR_exp` gives the Tail Value-at-Risk.
- `VaR_exp` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Exponential Distribution: `E_exp()`, `Elim_exp()`, `Etronq_exp()`, `MGF_exp()`, `Mexcess_exp()`, `SL_exp()`, `TVaR_exp()`, `VaR_exp()`, `kthmoment_exp()`

Examples

```
# With scale parameter
V_exp(scale = 4)

# With rate parameter
V_exp(rate = 0.25)
```

V_gamma

Variance of the Gamma distribution

Description

Variance of the Gamma distribution with shape parameter α and rate parameter β .

Usage

```
V_gamma(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter α , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, $scale = 1 / rate$.

Details

The Gamma distribution with shape parameter α and rate parameter β has density:

$$f(x) = \frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$$

for $x \in \mathcal{R}^+$, $\beta, \alpha > 0$.

Value

Function :

- [MGF_gamma](#) gives the moment generating function (MGF).
- [E_gamma](#) gives the expected value.
- [V_gamma](#) gives the variance.
- [kthmoment_gamma](#) gives the kth moment.
- [Etronq_gamma](#) gives the truncated mean.
- [SL_gamma](#) gives the stop-loss.
- [Elim_gamma](#) gives the limited mean.
- [Mexcess_gamma](#) gives the mean excess loss.
- [TVaR_gamma](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Gamma Distribution: [E_gamma\(\)](#), [Elim_gamma\(\)](#), [Etronq_gamma\(\)](#), [MGF_gamma\(\)](#), [Mexcess_gamma\(\)](#), [SL_gamma\(\)](#), [TVaR_gamma\(\)](#), [VaR_gamma\(\)](#), [kthmoment_gamma\(\)](#)

Examples

```
# With scale parameter
V_gamma(shape = 3, scale = 4)

# With rate parameter
V_gamma(shape = 3, rate = 0.25)
```

V_hyper

Variance of the Hypergeometric distribution

Description

Variance of the Hypergeometric distribution where we have a sample of k balls from an urn containing N of which m are white and n are black.

Usage

```
V_hyper(N = n + m, m, n = N - m, k)
```

Arguments

N	Total number of balls (white and black) in the urn. $N = n + m$
m	Number of white balls in the urn.
n	Number of black balls in the urn. Can specify n instead of N.
k	Number of balls drawn from the urn, $k = 0, 1, \dots, m + n$.

Details

The Hypergeometric distribution for N total items of which m are of one type and n of the other and from which k items are picked has probability mass function :

$$Pr(X = x) = \frac{\binom{m}{k} \binom{n}{k-x}}{\binom{N}{k}}$$

for $x = 0, 1, \dots, \min(k, m)$.

Value

Function :

- [E_hyper](#) gives the expected value.
- [V_hyper](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Hypergeometric Distribution: [E_hyper\(\)](#)

Examples

```
# With total balls specified
V_hyper(N = 5, m = 2, k = 2)

# With number of each colour of balls specified
V_hyper(m = 2, n = 3, k = 2)
```

V_IG

*Variance of the Inverse Gaussian distribution***Description**

Variance of the Inverse Gaussian distribution with mean μ and shape parameter β .

Usage

V_IG(mean, shape = dispersion * mean^2, dispersion = shape/mean^2)

Arguments

mean	mean (location) parameter μ , must be positive.
shape	shape parameter β , must be positive.
dispersion	alternative parameterization to the shape parameter, dispersion = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [MGF_IG](#) gives the moment generating function (MGF).
- [E_IG](#) gives the expected value.
- [V_IG](#) gives the variance.
- [Etronq_IG](#) gives the truncated mean.
- [SL_IG](#) gives the stop-loss.
- [Elim_IG](#) gives the limited mean.
- [Mexcess_IG](#) gives the mean excess loss.
- [TVaR_IG](#) gives the Tail Value-at-Risk.
- [VaR_IG](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Inverse Gaussian Distribution: [E_IG\(\)](#), [Elim_IG\(\)](#), [Etronq_IG\(\)](#), [MGF_IG\(\)](#), [Mexcess_IG\(\)](#), [SL_IG\(\)](#), [TVaR_IG\(\)](#), [VaR_IG\(\)](#)

Examples

```
V_IG(mean = 2, shape = 5)
```

V_llogis	<i>Variance of the Loglogistic distribution</i>
----------	---

Description

Variance of the Loglogistic distribution with shape parameter τ and scale parameter λ .

Usage

```
V_llogis(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter τ , must be positive integer.
rate	alternative parameterization the scale parameter, rate = 1 / scale.
scale	λ rate parameter, must be positive.

Details

The Loglogistic distribution with shape parameter τ and scale parameter λ has density:

$$\frac{\tau \lambda^\tau x^{\tau-1}}{(\lambda^\tau + x^\tau)^2}$$

for $x \in \mathcal{R}^+$, $\lambda, \tau > 0$.

Value

Function :

- [E_llogis](#) gives the expected value.
- [V_llogis](#) gives the variance.
- [kthmoment_llogis](#) gives the kth moment.
- [Etronq_llogis](#) gives the truncated mean.
- [SL_llogis](#) gives the stop-loss.
- [Elim_llogis](#) gives the limited mean.
- [Mexcess_llogis](#) gives the mean excess loss.
- [TVaR_llogis](#) gives the Tail Value-at-Risk.
- [VaR_llogis](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Loglogistic Distribution: [E_llogis\(\)](#), [Elim_llogis\(\)](#), [Etronq_llogis\(\)](#), [Mexcess_llogis\(\)](#), [SL_llogis\(\)](#), [TVaR_llogis\(\)](#), [VaR_llogis\(\)](#), [kthmoment_llogis\(\)](#)

Examples

```
# With scale parameter
V_llogis(shape = 3, scale = 5)

# With rate parameter
V_llogis(shape = 3, rate = 0.2)

# Equivalently :
kthmoment_llogis(k = 2, shape = 3, rate = 0.2) - kthmoment_llogis(k = 1, shape = 3, rate = 0.2)^2
```

V_Inorm

Variance of the Lognormal distribution

Description

Variance of the Lognormal distribution with mean μ and variance σ .

Usage

```
V_Inorm(meanlog, sdlog)
```

Arguments

meanlog location parameter μ .
sdlog standard deviation σ , must be positive.

Details

The Log-normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma x} e^{-\frac{1}{2}\left(\frac{\ln(x)-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}^+$, $\mu \in \mathcal{R}$, $\sigma > 0$.

Value

Function :

- `E_lnorm` gives the expected value.
- `V_lnorm` gives the variance.
- `kthmoment_lnorm` gives the kth moment.
- `Etronq_lnorm` gives the truncated mean.
- `SL_lnorm` gives the stop-loss.
- `Elim_lnorm` gives the limited mean.
- `Mexcess_lnorm` gives the mean excess loss.
- `TVaR_lnorm` gives the Tail Value-at-Risk.
- `VaR_lnorm` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Lognormal distribution: `E_lnorm()`, `Elim_lnorm()`, `Etronq_lnorm()`, `Mexcess_lnorm()`, `SL_lnorm()`, `TVaR_lnorm()`, `VaR_lnorm()`, `kthmoment_lnorm()`

Examples

```
V_lnorm(meanlog = 3, sdlog = 5)
```

V_logarithmic	<i>Variance of the Logarithmic distribution</i>
---------------	---

Description

Variance of the Logarithmic distribution with probability parameter γ .

Usage

```
V_logarithmic(prob)
```

Arguments

prob probability parameter γ .

Details

The Logarithmic distribution with probability parameter γ has probability mass function

$$Pr(X = k) = \frac{-\gamma^k}{\ln(1 - \gamma)k}$$

, for $k = 0, 1, 2, \dots$, and $\gamma \in (0, 1]$

Value

Function :

- [MGF_logarithmic](#) gives the moment generating function (MGF).
- [PGF_logarithmic](#) gives the probability generating function (PGF).
- [E_logarithmic](#) gives the expected value.
- [V_logarithmic](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Logarithmic Distribution: [E_logarithmic\(\)](#), [MGF_logarithmic\(\)](#), [PGF_logarithmic\(\)](#)

Examples

```
V_logarithmic(prob = 0.50)
```

V_negbinom

Variance of the negative binomial distribution

Description

Variance of the negative binomial distribution with parameters r (number of successful trials) and p (probability of success).

Usage

```
V_negbinom(
  size,
  prob = (1/(1 + beta)),
  beta = ((1 - prob)/prob),
  nb_tries = FALSE
)
```

Arguments

size	Number of successful trials.
prob	Probability of success.
beta	Alternative parameterization of the negative binomial distribution where $\beta = (1 - p) / p$.
nb_tries	logical; if FALSE (default) number of trials until the r th success, otherwise, number of failures until the r th success.

Details

When k is the number of failures until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{r+k-1}{k} (p)^r (1-p)^k$$

for $k \in \{0, 1, \dots\}$

When k is the number of trials until the r th success, with a probability p of a success, the negative binomial has density:

$$\binom{k-1}{r-1} (p)^r (1-p)^{k-r}$$

for $k \in \{r, r+1, r+2, \dots\}$

The alternative parameterization of the negative binomial with parameter β , and k being the number of trials, has density:

$$\frac{\Gamma(r+k)}{\Gamma(r)k!} \left(\frac{1}{1+\beta}\right)^r \left(\frac{\beta}{1+\beta}\right)^{k-r}$$

for $k \in \{0, 1, \dots\}$

Value

Function :

- [MGF_negbinom](#) gives the moment generating function (MGF).
- [PGF_negbinom](#) gives the probability generating function (PGF).
- [E_negbinom](#) gives the expected value.
- [V_negbinom](#) gives the variance.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Negative Binomial Distribution: [E_negbinom\(\)](#), [MGF_negbinom\(\)](#), [PGF_negbinom\(\)](#)

Examples

```
# Where k is the number of trials for a rth success
V_negbinom(size = 2, prob = .4)

# Where k is the number of failures before a rth success
V_negbinom(size = 2, prob = .4, nb_tries = TRUE)

# With alternative parameterization where k is the number of trials
V_negbinom(size = 2, beta = 1.5)
```

V_norm

*Variance of the Normal distribution***Description**

Variance of the Normal distribution with mean μ and variance σ .

Usage

V_norm(mean, sd)

Arguments

mean	mean (location) parameter μ .
sd	standard deviation σ , must be positive.

Details

The Normal distribution with mean μ and standard deviation σ has density:

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

for $x \in \mathcal{R}, \mu \in \mathcal{R}, \sigma > 0$.

Value

Function :

- [MGF_norm](#) gives the moment generating function (MGF).
- [E_norm](#) gives the expected value.
- [V_norm](#) gives the variance.
- [Etronq_norm](#) gives the truncated mean.
- [SL_norm](#) gives the stop-loss.
- [Elim_norm](#) gives the limited mean.
- [Mexcess_norm](#) gives the mean excess loss.
- [TVaR_norm](#) gives the Tail Value-at-Risk.
- [VaR_norm](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Normal distribution: [E_norm\(\)](#), [Elim_norm\(\)](#), [Etronq_norm\(\)](#), [MGF_norm\(\)](#), [Mexcess_norm\(\)](#), [SL_norm\(\)](#), [TVaR_norm\(\)](#), [VaR_norm\(\)](#)

Examples

```
V_norm(mean = 3, sd = 5)
```

V_pareto	<i>Variance of the Pareto distribution</i>
----------	--

Description

Variance of the Pareto distribution with shape parameter α and rate parameter λ .

Usage

```
V_pareto(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter α , must be positive.
rate	λ rate parameter, must be positive.
scale	alternative parameterization to the rate parameter, scale = 1 / rate.

Details

The Pareto distribution with rate parameter λ as well as shape parameter α has density:

$$f(x) = \frac{\alpha \lambda^\alpha}{(\lambda + x)^{\alpha+1}}$$

for $x \in \mathcal{R}^+$, $\alpha, \lambda > 0$.

Value

Function :

- [d_pareto](#) gives the density function.
- [p_pareto](#) gives the cumulative density function.
- [E_pareto](#) gives the expected value.
- [V_pareto](#) gives the variance.
- [kthmoment_pareto](#) gives the kth moment.
- [Etronq_pareto](#) gives the truncated mean.
- [SL_pareto](#) gives the stop-loss.
- [Elim_pareto](#) gives the limited mean.
- [Mexcess_pareto](#) gives the mean excess loss.
- [TVaR_pareto](#) gives the Tail Value-at-Risk.
- [VaR_pareto](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Pareto Distribution: [E_pareto\(\)](#), [Elim_pareto\(\)](#), [Etronq_pareto\(\)](#), [Mexcess_pareto\(\)](#), [SL_pareto\(\)](#), [TVaR_pareto\(\)](#), [VaR_pareto\(\)](#), [d_pareto\(\)](#), [kthmoment_pareto\(\)](#), [p_pareto\(\)](#)

Examples

```
# With scale parameter
V_pareto(shape = 5, rate = 2)

# With rate parameter
V_pareto(shape = 5, scale = 0.5)
```

V_pois

Variance of the Poisson distribution

Description

Variance of the Poisson distribution with rate parameter λ .

Usage

```
V_pois(lambda)
```

Arguments

lambda Rate parameter λ .

Details

The Poisson distribution with rate parameter λ has probability mass function :

$$Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!}$$

for $k = 0, 1, 2, \dots$, and $\lambda > 0$

Value

Function :

- [MGF_pois](#) gives the moment generating function (MGF).
- [PGF_pois](#) gives the probability generating function (PGF).
- [E_pois](#) gives the expected value.
- [V_beta](#) gives the variance.
- [Etronq_pois](#) gives the truncated mean.
- [TVaR_pois](#) gives the Tail Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Poisson Distribution: [E_pois\(\)](#), [Etronq_pois\(\)](#), [MGF_pois\(\)](#), [PGF_pois\(\)](#), [TVaR_pois\(\)](#)

Examples

```
V_pois(lambda = 3)
```

V_unif

Variance of the Uniform distribution

Description

Variance of the Uniform distribution with min a and max b .

Usage

```
V_unif(min = 0, max = 1)
```

Arguments

min, max lower and upper limits of the distribution. Must be finite.

Details

The (continuous) uniform distribution with min and max parameters a and b respectively has density:

$$f(x) = \frac{1}{b-a} \times \mathbf{1}_{\{x \in [a,b]\}}$$

for $x \in [a, b]$.

Value

Function :

- [E_unif](#) gives the expected value.
- [V_unif](#) gives the variance.
- [kthmoment_unif](#) gives the kth moment.
- [Etronq_unif](#) gives the truncated mean.
- [SL_unif](#) gives the stop-loss.
- [Elim_unif](#) gives the limited mean.
- [Mexcess_unif](#) gives the mean excess loss.
- [TVaR_unif](#) gives the Tail Value-at-Risk.
- [VaR_unif](#) gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Continuous Uniform Distribution: [E_unif\(\)](#), [Elim_unif\(\)](#), [Etronq_unif\(\)](#), [Mexcess_unif\(\)](#), [SL_unif\(\)](#), [TVaR_unif\(\)](#), [VaR_unif\(\)](#), [kthmoment_unif\(\)](#)

Examples

```
V_unif(min = 3, max = 4)
```

V_unifD

Variance of the (discrete) Uniform distribution

Description

Variance of the (discrete) Uniform distribution with min a and max b .

Usage

```
V_unifD(min = 0, max = 1)
```

Arguments

`min`, `max` lower and upper limits of the distribution. Must be finite.

Details

The (discrete) uniform distribution with min and max parameters a and b respectively has density:

$$\Pr(X = x) = \frac{1}{b - a + 1}$$

for $x \in \{a, a + 1, \dots, b - 1, b\}$.

Value

Function :

- [E_unifD](#) gives the expected value.
- [V_unifD](#) gives the variance.
- [d_unifD](#) gives the density function.
- [D_unifD](#) gives the cumulative density function.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Discrete Uniform Distribution: [E_unifD\(\)](#), [d_unifD\(\)](#), [p_unifD\(\)](#)

Examples

```
# With scale parameter
V_unifD(min = 2, max = 5)
```

V_weibull

Variance of the Weibull distribution

Description

Variance of the Weibull distribution with shape parameter τ and rate parameter β .

Usage

```
V_weibull(shape, rate = 1/scale, scale = 1/rate)
```

Arguments

shape	shape parameter τ , must be positive integer.
rate	β is the rate parameter, must be positive.
scale	alternative parameterization to rate parameter, scale = 1 / rate.

Details

The Weibull distribution with shape parameter τ and rate parameter β has density:

$$f(x) = \beta\tau (\beta x)^{\tau-1} e^{-(\beta x)^\tau}$$

for $x \in \mathcal{R}^+$, $\beta > 0$, $\tau > 0$

Value

Returns numeric value. Function :

- `E_weibull` gives the expected value.
- `V_weibull` gives the variance.
- `kthmoment_weibull` gives the kth moment.
- `Etronq_weibull` gives the truncated mean.
- `SL_weibull` gives the stop-loss.
- `Elim_weibull` gives the limited mean.
- `Mexcess_weibull` gives the mean excess loss.
- `TVaR_weibull` gives the Tail Value-at-Risk.
- `VaR_weibull` gives the Value-at-Risk.

Invalid parameter values will return an error detailing which parameter is problematic.

See Also

Other Weibull Distribution: [E_weibull\(\)](#), [Elim_weibull\(\)](#), [Etronq_weibull\(\)](#), [Mexcess_weibull\(\)](#), [SL_weibull\(\)](#), [TVaR_weibull\(\)](#), [VaR_weibull\(\)](#), [kthmoment_weibull\(\)](#)

Examples

```
# With scale parameter
V_weibull(shape = 2, scale = 5)

# With rate parameter
V_weibull(shape = 2, rate = 0.2)
```

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