Package 'Distributacalcul'

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Type Package

Title Probability Distribution Functions

Version 0.2.2

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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URL https://alec42.github.io/Distributacalcul_Package/

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

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R topics documented:

`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:

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

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 :

- "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 $x \in \{a, a + 1, \ldots, b - 1, b\}$.

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:

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

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()`, `Etronq_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:

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

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:

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

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:

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

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

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(), 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_lnorm *Limited mean of the Lognormal distribution*

Description

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

Usage

```
Elim_lnorm(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:

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

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:

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

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:

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

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 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(), 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

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:

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

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

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.
less.than.d	logical; if TRUE (default) truncated mean for values <= 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 <= d, otherwise, for values > d.

Details

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

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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 <= 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

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.
less.than.d	logical; if TRUE (default) truncated mean for values <= d, otherwise, for values > d.

Details

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

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

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 <= d, otherwise, for values > d.

Details

The Exponential distribution with rate parameter β has density:

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

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 *Truncated mean of the Gamma distribution*

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 <= d, otherwise, for values > d.

Details

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

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

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 <= 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 <= 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_lnorm` *Truncated mean of the Lognormal distribution*

Description

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

Usage

```
Etronq_lnorm(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 <= d, otherwise, for values > d.

Details

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

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

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 <= d, otherwise, for values > d.

Details

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

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

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 <= 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 <= 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 $k = 0, 1, 2, \ldots$, 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 <= 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 — *Truncated mean of the Weibull distribution*

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 <= d, otherwise, for values > d.

Details

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

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

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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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 — *Expected value of the Burr distribution*

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:

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

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:

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

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 *Expected value of the Gamma distribution*

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:

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

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 — *Expected value of the Hypergeometric distribution*

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

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 *Expected value of the Lognormal distribution*

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:

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

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 $k = 0, 1, 2, \ldots$, 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 `r`th success, otherwise, number of failures until the `r`th success.

Details

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

$$\left(\frac{r+k-1}{k}\right)(p)^r(1-p)^k$$

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

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

$$\left(\frac{k-1}{r-1}\right)(p)^r(1-p)^{k-r}$$

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 — *Expected value of the Normal distribution*

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:

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

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:

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

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 $k = 0, 1, 2, \ldots$, 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:

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

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

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:

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

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 *kth moment of the Beta distribution*

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` *kth moment of the Burr distribution*

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 *kth moment of the Erlang distribution*

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:

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

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)
```

---

kthmoment_exp *kth moment of the Exponential distribution*

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:

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

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 *kth moment of the Gamma distribution*

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:

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

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` *kth moment of the Loglogistic distribution*

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)
```

`kthmoment_lnorm` *kth moment of the Lognormal distribution*

Description

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

Usage

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

Arguments

k	kth-moment.
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(), V_lnorm(), VaR_lnorm()

Examples

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

---

kthmoment_pareto *kth moment of the Pareto distribution*

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

k	kth-moment.
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(), 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)
```

`kthmoment_unif` *kth moment of the Uniform distribution*

Description

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

Usage

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

Arguments

`k`	kth-moment.
`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()`, `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:

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

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 *Interactive distribution visualization (server side)*

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 Distributacalcul_vis module. Should not be run directly.

lawParametersBoxUI — *Interactive distribution visualization (UI side)*

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 — *Mean excess loss of the Beta distribution*

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:

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

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 *Mean excess loss of the Erlang distribution*

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:

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

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` *Mean excess loss of the Exponential distribution*

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:

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

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

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:

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

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:

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

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` *Mean excess loss of the Loglogistic distribution*

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_lnorm   *Mean excess loss of the Lognormal distribution*

Description

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

Usage

```
Mexcess_lnorm(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:

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

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(), 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:

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

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)
```

Mexcess_pareto — *Mean excess loss of the Pareto distribution*

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

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()`, `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` *Mean excess loss of the Weibull distribution*

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:

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

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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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:

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

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:

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

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:

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

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:

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

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 $k = 0, 1, 2, \ldots$, 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

t	t
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 rth 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 rth 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:

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

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 :

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

for $k = 0, 1, 2, \ldots$, 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 <= k), otherwise, Pr(M > k).

Details

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

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

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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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 $k = 0, 1, 2, \ldots$, 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

t	t
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 rth success, with a probability p of a success, the negative binomial has density:

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

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

When k is the number of trials until the rth 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 $k \in \{r, r+1, r+2, \ldots\}$

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 $k \in \{0, 1, \ldots\}$

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)
```

PGF_pois *Probability Generating Function of the Poisson distribution*

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 $k = 0, 1, 2, \ldots$, 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. • "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")

vark_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,
            vark = vark_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. • "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 \codeTRUE (default) probabilities are Pr(M <= 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. • "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 *Cumulative probability mass function of the (discrete) Uniform distribution*

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

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()`, `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:

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

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:

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

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

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:

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

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 *Stop-loss of the Loglogistic distribution*

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_lnorm *Stop-loss of the Lognormal distribution*

Description

Stop-loss of the Lognormal distribution with mean μ and variance σ.

Usage

```
SL_lnorm(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:

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

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(), 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:

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

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

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()`, `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:

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

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:

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

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(), 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

kap	probability.
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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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:

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

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:

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

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

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:

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

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:

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

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 *Tail Value-at-Risk of the Loglogistic distribution*

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_lnorm *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_lnorm(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:

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

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(), 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:

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

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

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(), 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 :

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

for $k = 0, 1, 2, \ldots$, 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 *Tail Value-at-Risk of the Weibull Distribution*

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:

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

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

kap	probability.
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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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

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()`, `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:

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

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:

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

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:

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

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_lnorm` *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_lnorm(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:

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

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:

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

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:

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

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:

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

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 :

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

for $k = 0, 1, 2, \ldots, n$, $p \in [0, 1]$, 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:

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

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:

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

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:

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

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, ..., 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 :

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

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

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` *Variance of the Loglogistic distribution*

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_lnorm *Variance of the Lognormal distribution*

Description

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

Usage

```
V_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:

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

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 *Variance of the Logarithmic distribution*

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 $k = 0, 1, 2, \ldots$, 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 rth success, with a probability p of a success, the negative binomial has density:

$$\left(\frac{r+k-1}{k}\right)(p)^r(1-p)^k$$

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

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

$$\left(\frac{k-1}{r-1}\right)(p)^r(1-p)^{k-r}$$

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:

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

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` *Variance of the Pareto distribution*

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:

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

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 :

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

for $k = 0, 1, 2, \ldots$, 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:

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

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

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:

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

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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