Package ‘robeth’

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Description Locations problems, M-estimates of coefficients and scale in linear regression, Weights for bounded influence regression, Covariance matrix of the coefficient estimates, Asymptotic relative efficiency of regression M-estimates, Robust testing in linear models, High breakdown point regression, M-estimates of covariance matrices, M-estimates for discrete generalized linear models.

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`robeth-package` *Interface for the FORTRAN programs developed at the ETH-Zuerich and then at IUMSP-Lausanne*

Description

This package allows the computation of a broad class of procedures based on M-estimation and high breakdown point estimation, including robust regresion, robust testing of linear hypotheses and robust covariances. The reference book quoted below is required for the theoritical background of the statistical and numerical methods

Details

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References

Marazzi A., (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California.

Examples

```
library(robeth)

#
# ------------- Examples of Chapter 1: Location problems ------------------------------
#
 y  <- c(6.0,7.0,5.0,10.5,8.5,3.5,6.1,4.0,4.6,4.5,5.9,6.5)
 n  <- 12
 dfvals()
#---------------------------------------------------------------------
# M-estimate (tm) of location and confidence interval (tl,tu)
#
 dfrpar(as.matrix(y),"huber")
 libeth()
 s  <- lilars(y);  t0 <- s$theta;  s0 <- s$sigma
 s  <- lyhalg(y=y,theta=t0,sigmai=s0)
 tm <- s$theta;    vartm <- s$var
 s  <- quant(0.975)
 tl <- tm-s$x*sqrt(vartm)
 tu <- tm+s$x*sqrt(vartm)
#---------------------------------------------------------------------
# Hodges and Lehmann estimate (th) and confidence interval (zl,zu)
#
 m  <- n*(n+1)/2 # n even
 k1 <- m/2; k2 <- k1+1
 z1 <- lyhdle(y=y,k=k1);   z2 <- lyhdle(y=y,k=k2)
 th <- (z1$hdle+z2$hdle)/2.
 ku <- liindh(0.95,n);     kl <- liindh(0.05,n)
 zu <- lyhdle(y=y,k=ku$k); zl <- lyhdle(y=y,k=kl$k)
```

```
#.......................................................................
{
 cat(" tm, tl, tu : ",round(c(tm,tl,tu),3),"\n")
 cat(" th, zl, zu : ",round(c(th,zl$hdle,zu$hdle),3),"\n")
}
#  tm, tl, tu : 5.809 4.748 6.87
#  th, zl, zu : 5.85 5 7
#=======================================================================
#
# Two sample problem
#
 y <- c(17.9,13.3,10.6,7.6,5.7,5.6,5.4,3.3,3.1,0.9)
 n <- 10
 x <- c(7.7,5.0,1.7,0.0,-3.0,-3.1,-10.5)
 m <- 7
#-----------------------------------------------------------------------
# Estimate (dm) and confidence interval [dl,du] based on Mann-Whitney
#
 k1 <- m*n/2;  k2 <- k1+1
 s1 <- lymnwt(x=x,y=y,k=k1);       s2 <- lymnwt(x=x,y=y,k=k2)
 dm <- (s1$tmnwt+s2$tmnwt)/2.0
 sl <- liindw(0.05,m,n);           kl <- sl$k
 s  <- lymnwt(x=x,y=y,k=kl);       dl <- s$tmnwt
 s  <- lymnwt(x=x,y=y,k=m*n-kl+1); du <- s$tmnwt
#-----------------------------------------------------------------------
# Tau-test . P-value (P)
#
 z <- c(x,y)
 dfrpar(as.matrix(z),"huber")
 libeth()
 s <- lytau2(z=z,m=m,n=n)
 P <- s$p
#
# estimate (tm) and confidence interval (tl,tu)
#
 tm <- s$deltal
 c22<- s$cov[3]
 s  <- quant(0.975)
 tl <- tm-s$x*sqrt(c22)
 tu <- tm+s$x*sqrt(c22)
#.......................................................................
{
 cat("dm, dl, du:",round(c(dm,dl,du),3),"\n")
 cat("P, tm, tl, tu:",round(c(P,tm,tl,tu),3),"\n")
}
# dm, dl, du: 6.35 2.9 12.9
# P, tm, tl, tu: 0.014 6.918 1.562 12.273

#
# Examples of Chapter 2: M-estimates of coefficients and scale in linear regression
#
# Read data; declare the vector wgt; load defaults
#
```

```
 z <- c(-1, -2,  0,   35,         1,  0, -3,   20,
        -1, -2,  0,   30,         1,  0, -3,   39,
        -1, -2,  0,   24,         1,  0, -3,   16,
        -1, -2,  0,   37,         1,  0, -3,   27,
        -1, -2,  0,   28,         1,  0, -3,  -12,
        -1, -2,  0,   73,         1,  0, -3,    2,
        -1, -2,  0,   31,         1,  0, -3,   31,
        -1, -2,  0,   21,         1,  0, -1,   26,
        -1, -2,  0,   -5,         1,  0, -1,   60,
        -1,  0,  0,   62,         1,  0, -1,   48,
        -1,  0,  0,   67,         1,  0, -1,   -8,
        -1,  0,  0,   95,         1,  0, -1,   46,
        -1,  0,  0,   62,         1,  0, -1,   77,
        -1,  0,  0,   54,         1,  0,  1,   57,
        -1,  0,  0,   56,         1,  0,  1,   89,
        -1,  0,  0,   48,         1,  0,  1,  103,
        -1,  0,  0,   70,         1,  0,  1,  129,
        -1,  0,  0,   94,         1,  0,  1,  139,
        -1,  0,  0,   42,         1,  0,  1,  128,
        -1,  2,  0,  116,         1,  0,  1,   89,
        -1,  2,  0,  105,         1,  0,  1,   86,
        -1,  2,  0,   91,         1,  0,  3,  140,
        -1,  2,  0,   94,         1,  0,  3,  133,
        -1,  2,  0,  130,         1,  0,  3,  142,
        -1,  2,  0,   79,         1,  0,  3,  118,
        -1,  2,  0,  120,         1,  0,  3,  137,
        -1,  2,  0,  124,         1,  0,  3,   84,
        -1,  2,  0,   -8,         1,  0,  3,  101)
  xx    <- matrix(z,ncol=4, byrow=TRUE)
  dimnames(xx) <- list(NULL,c(”z2”,”xS”,”xT”,”y”))
  z2    <- xx[,”z2”]; xS <- xx[,”xS”]; xT <- xx[,”xT”]
  x     <- cbind(1, z2, xS+xT, xS-xT, xS^2+xT^2, xS^2-xT^2, xT^3)
  y     <- xx[,”y”]
  wgt   <- vector(”numeric”,length(y))
  n     <- 56; np <- 7
  dfvals()
# Set parameters for Huber estimate
  dfrpar(x, ”huber”)
# Compute the constants beta, bet0, epsi2 and epsip
  ribeth(wgt)
  ribet0(wgt)
  s     <- liepsh()
  epsi2 <- s$epsi2;    epsip <- s$epsip
#
# Least squares solution (theta0,sigma0)
#
  z     <- riclls(x, y)
  theta0<- z$theta; sigma0 <- z$sigma
# Preliminary estimate of the covariance matrix of the coefficients
  cv    <- kiascv(z$xt, fu=epsi2/epsip^2, fb=0.)
  cov   <- cv$cov
#-----------------------------------------------------------------------
# Solution (theta1,sigma1) by means of RYHALG.
```

```
#
  zr    <- ryhalg(x,y,theta0,wgt,cov,sigmai=sigma0,ic=0)
  theta1<- zr$theta[1:np]; sigma1 <- zr$sigmaf; nit1 <- zr$nit
#-----------------------------------------------------------------------
# Solution (theta2,sigma2) by means of RYWALG (recompute cov)
#
  cv <- ktaskv(x, f=epsi2/epsip^2)
  zr <- rywalg(x, y, theta0, wgt, cv$cov, sigmai=sigma0)
  theta2 <- zr$theta[1:np]; sigma2 <- zr$sigmaf; nit2 <- zr$nit
#-----------------------------------------------------------------------
# Solution (theta3,sigma3) by means of RYSALG with ISIGMA=2.
#
  zr <- rysalg(x,y, theta0, wgt, cv$cov, sigma0, isigma=2)
  theta3 <- zr$theta[1:np]; sigma3 <- zr$sigmaf; nit3 <- zr$nit
#-----------------------------------------------------------------------
# Solution (theta4,sigma4) by means of RYNALG with ICNV=2 and ISIGMA=0.
#
# Invert cov
  covm1 <- cv$cov
  zc <- mchl(covm1,np)
  zc <- minv(zc$a, np)
  zc <- mtt1(zc$r,np)
  covm1 <- zc$b
  zr <- rynalg(x,y, theta0, wgt, covm1, sigmai=sigma3,
        iopt=1, isigma=0, icnv=2)
  theta4 <- zr$theta[1:np]; sigma4 <- zr$sigmaf; nit4 <- zr$nit
#.......................................................................
{
  cat("theta0 : ",round(theta0[1:np],3),"\n")
  cat("sigma0 : ",round(sigma0,3),"\n")
  cat("theta1 : ",round(theta1,3),"\n")
  cat("sigma1, nit1 : ",round(sigma1,3),nit1,"\n")
  cat("theta2 : ",round(theta2,3),"\n")
  cat("sigma2, nit2 : ",round(sigma2,3),nit2,"\n")
  cat("theta3 : ",round(theta3,3),"\n")
  cat("sigma3, nit3 : ",round(sigma3,3),nit3,"\n")
  cat("theta4 : ",round(theta4,3),"\n")
  cat("sigma4, nit4 : ",round(sigma4,3),nit4,"\n")
}
# theta0 :  68.634 3.634 24.081 -8.053 -0.446 -0.179 -1.634
# sigma0 :  26.635
# theta1 :  70.006 5.006 24.742 -6.246 -0.079 0.434 -1.487
# sigma1, nit1 :  23.564 7
# theta2 :  70.006 5.006 24.742 -6.245 -0.079 0.434 -1.487
# sigma2, nit2 :  23.563 7
# theta3 :  69.993 5.002 24.766 -6.214 -0.055 0.44 -1.48
# sigma3, nit3 :  22.249 3
# theta4 :  69.993 5.002 24.766 -6.214 -0.055 0.44 -1.48
# sigma4, nit4 :  22.249 3


#
# ---- Examples of Chapter 3: Weights for bounded influence regression ------
```

```
#

#=======================================================================
 rbmost <- function(x,y,cc,usext=userfd) {
 n      <- nrow(x); np <- ncol(x); dfcomn(xk=np)
 .dFvPut(1,"itw")
 z      <- wimedv(x)
 z      <- wyfalg(x, z$a, y, exu=usext); nitw <- z$nit
 wgt    <- 1/z$dist; wgt[wgt>1.e6] <- 1.e6
 z      <- comval()
 bto    <- z$bt0;    ipso   <- z$ipsi; co <- z$c
 z      <- ribet0(wgt, itype=2, isqw=0)
 xt     <- x*wgt;    yt     <- y * wgt
 z      <- rilars(xt, yt)
 theta0 <- z$theta;  sigma0 <- z$sigma
 rs     <- z$rs/wgt; r1     <- rs/sigma0
 dfcomn(ipsi=1,c=cc)
 z      <- liepsh(cc)
 den    <- z$epsip
 g      <- Psp(r1)/den # (see Psi in Chpt. 14)
 dfcomn(ipsi=ipso, c=co, bet0=bto)
 list(theta=theta0, sigma=sigma0, rs=rs, g=g, nitw=nitw)
}
#-----------------------------------------------------------------------
# Mallows-standard estimate (with wyfalg and rywalg)
#
 Mal.Std <- function(x, y, b2=-1, cc=-1, isigma=2) {
 n <- length(y); np <- ncol(x)
 dfrpar(x, "Mal-Std", b2, cc); .dFv <- .dFvGet()
 if (isigma==1) {dfcomn(d=.dFv$ccc); .dFvPut(1,"isg")}
# Weights
 z      <- wimedv(x)
 z      <- wyfalg(x, z$a, y); nitw <- z$nit
 wgt    <- Www(z$dist)   # See Www in Chpt. 14
# Initial cov. matrix of coefficient estimates
 z      <- kiedch(wgt)
 cov    <- ktaskw(x, z$d, z$e, f=1/n)
# Initial theta and sigma
 z      <- rbmost(x,y,1.5,userfd)
 theta0 <- z$theta; sigma0 <- z$sigma; nitw0 <- z$nitw
# Final theta and sigma
 if (isigma==1) ribeth(wgt) else ribet0(wgt)
 z      <- rywalg(x, y,theta0,wgt,cov$cov, sigmai=sigma0)
 theta1 <- z$theta[1:np]; sigma1 <- z$sigmaf; nit1 <- z$nit
# Covariance matrix of coefficient estimates
 z      <- kfedcc(wgt, z$rs, sigma=sigma1)
 cov    <- ktaskw(x, z$d, z$e, f=(sigma1^2)/n)
 sd1    <- NULL; for (i in 1:np) { j <- i*(i+1)/2
 sd1    <- c(sd1,cov$cov[j]) }
 sd1    <- sqrt(sd1)
#.......................................................................
{
  cat("rbmost: theta0 : ",round(theta0[1:np],3),"\n")
  cat("rbmost: sigma0, nitw : ",round(sigma0,3),nitw0,"\n")
  cat("Mallows-Std: theta1 : ",round(theta1,3),"\n")
  cat("Mallows-Std: sd1    : ",round(sd1,3),"\n")
  cat("Mallows-Std: sigma1, nitw, nit1 : ",round(sigma1,3),nitw,nit1,"\n")
}

#.......................................................................
 list(theta0=theta0[1:np], sigma0=sigma0, nitw=nitw,
      theta1=theta1, sigma1=sigma1, nit1=nit1, sd1=sd1)}
#-----------------------------------------------------------------------
# Krasker-Welsch estimate (with wynalg and rynalg)
#
 Kra.Wel <- function(x, y, ckw=-1, isigma=2) {
 n <- length(y); np <- ncol(x)
 dfrpar(x, "Kra-Wel", ckw); .dFv <- .dFvGet()
 if (isigma==1) {dfcomn(d=.dFv$ccc); .dFvPut(1,"isg")}
# Weights
 z      <- wimedv(x)
 z      <- wynalg(x, z$a); nitw <- z$nit
 wgt    <- Www(z$dist)  # See Www in Chpt. 14
# Initial cov. matrix of coefficient estimates
 z      <- kiedch(wgt)
 cov    <- ktaskw(x, z$d, z$e, f=1/n)
# Initial theta and sigma
 z      <- rbmost(x, y, cc=1.5)
 theta0 <- z$theta;       sigma0 <- z$sigma; nitw0 <- z$nitw
# Final theta and sigma
  if (isigma==1) ribeth(wgt) else ribet0(wgt)
 z      <- rynalg(x, y,theta0,wgt,cov$cov, sigmai=sigma0)
 theta2 <- z$theta[1:np]; sigma2 <- z$sigma; nit2 <- z$nit
#
# Covariance matrix of coefficient estimates
#
 z      <- kfedcc(wgt, z$rs, sigma=sigma2)
 cov    <- ktaskw(x, z$d, z$e, f=(sigma2^2)/n)
 sd2    <- NULL; for (i in 1:np) { j <- i*(i+1)/2
 sd2    <- c(sd2,cov$cov[j]) }
 sd2    <- sqrt(sd2)
#.......................................................................
{
  cat("rbmost: theta0 : ",round(theta0[1:np],3),"\n")
  cat("rbmost: sigma0, nitw : ",round(sigma0,3),nitw0,"\n")
  cat("Krasker-Welsch: theta2 : ",round(theta2,3),"\n")
  cat("Krasker-Welsch: sd2    : ",round(sd2,3),"\n")
  cat("Krasker-Welsch: sigma2, nitw, nit2 : ",round(sigma2,3),nitw,nit2,"\n")
}
#.......................................................................
 list(theta0=theta0[1:np], sigma0=sigma0, nitw=nitw,
      theta2=theta2, sigma2=sigma2, nit2=nit2, sd2=sd2)}
#-----------------------------------------------------------------------
# Read data; load defaults
#
  z <- c( 8.2,  4, 23.005,  1,   7.6,  5, 23.873,  1,
          4.6,  0, 26.417,  1,   4.3,  1, 24.868,  1,
          5.9,  2, 29.895,  1,   5.0,  3, 24.200,  1,
          6.5,  4, 23.215,  1,   8.3,  5, 21.862,  1,
         10.1,  0, 22.274,  1,  13.2,  1, 23.830,  1,
         12.6,  2, 25.144,  1,  10.4,  3, 22.430,  1,
         10.8,  4, 21.785,  1,  13.1,  5, 22.380,  1,
         13.3,  0, 23.927,  1,  10.4,  1, 33.443,  1,
         10.5,  2, 24.859,  1,   7.7,  3, 22.686,  1,
         10.0,  0, 21.789,  1,  12.0,  1, 22.041,  1,
         12.1,  4, 21.033,  1,  13.6,  5, 21.005,  1,
         15.0,  0, 25.865,  1,  13.5,  1, 26.290,  1,
         11.5,  2, 22.932,  1,  12.0,  3, 21.313,  1,
         13.0,  4, 20.769,  1,  14.1,  5, 21.393,  1)
 x      <- matrix(z, ncol=4, byrow=TRUE)
 y      <- c( 7.6,  7.7,  4.3,  5.9,  5.0,  6.5,  8.3,  8.2, 13.2, 12.6,
             10.4, 10.8, 13.1, 12.3, 10.4, 10.5,  7.7,  9.5, 12.0, 12.6,
             13.6, 14.1, 13.5, 11.5, 12.0, 13.0, 14.1, 15.1)
 dfvals()
 dfcomn(xk=4)
 cat("Results\n")
 z1     <- Mal.Std(x, y)
 z2     <- Kra.Wel(x, y)


#
# ---- Examples of Chapter 4: Covariance matrix of the coefficient estimates ------
#

#
# Read x[1:4] and then set x[,4] <- 1
#
 z     <- c(80, 27, 89, 1,   80, 27, 88, 1,   75, 25, 90, 1,
            62, 24, 87, 1,   62, 22, 87, 1,   62, 23, 87, 1,
            62, 24, 93, 1,   62, 24, 93, 1,   58, 23, 87, 1,
            58, 18, 80, 1,   58, 18, 89, 1,   58, 17, 88, 1,
            58, 18, 82, 1,   58, 19, 93, 1,   50, 18, 89, 1,
            50, 18, 86, 1,   50, 19, 72, 1,   50, 19, 79, 1,
            50, 20, 80, 1,   56, 20, 82, 1,   70, 20, 91, 1)
 x     <- matrix(z, ncol=4, byrow=TRUE)
 n     <- 21; np <- 4; ncov <- np*(np+1)/2
 dfvals()
# Cov. matrix of Huber-type estimates
 dfrpar(x, "huber")
 s     <- liepsh()
 epsi2 <- s$epsi2; epsip <- s$epsip
 z     <- rimtrf(x)
 xt    <- z$x; sg <- z$sg; ip <- z$ip
 zc    <- kiascv(xt, fu=epsi2/epsip^2, fb=0.)
 covi  <- zc$cov  # Can be used in ryhalg with ic=0
 zc    <- kfascv(xt, covi, f=1, sg=sg, ip=ip)
 covf  <- zc$cov
#.......................................................................
  str <- rep("  ", ncov); str[cumsum(1:np)] <- "\n"
```

```
{
  cat("covf:\n")
  cat(round(covf,6),sep=str)
}


#
# ---- Examples of Chapter 5: Asymptotic relative efficiency ------
#
#-----------------------------------------------------------------------
# Huber
#
    dfcomn(ipsi=1,c=1.345,d=1.345)
    .dFvPut(1,"ite")
    z <- airef0(mu=3, ialfa=1, sigmx=1)
#.......................................................................
{
   cat(" airef0 : Huber\n reff, alfa, beta, nit: ")
   cat(round(c(z$reff,z$alfa,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}
#-----------------------------------------------------------------------
# Schweppe: Krasker-Welsch
#
    dfcomn(ipsi=1,c=3.76,iucv=3,ckw=3.76,iwww=1)
    .dFvPut(3,"ite")
    z <- airef0(mu=3, ialfa=1, sigmx=1)
#.......................................................................
{
   cat(" airef0 : Krasker-Welsch\n reff, alfa, beta, nit: ")
   cat(round(c(z$reff,z$alfa,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}
#-----------------------------------------------------------------------
# Mallows-Standard
#
    dfcomn(ipsi=1,c=1.5,iucv=1,a2=0,b2=6.16,iww=3)
    .dFvPut(2,"ite")
    z <- airef0(mu=3, ialfa=1, sigmx=1)
#.......................................................................
{
   cat(" airef0 : Mallows-Std \n reff, alfa, beta, nit: ")
   cat(round(c(z$reff,z$alfa,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}
#=======================================================================
 z <- c(1, 0, 0,
        1, 0, 0,
        1, 0, 0,
        1, 0, 0,
        0, 1, 0,
        0, 1, 0,
        0, 1, 0,
        0, 1, 0,
        0, 0, 1,
        0, 0, 1,
       0, 0, 1,
       0, 0, 1)
 tt <- matrix(z,ncol=3,byrow=TRUE)
 n <- nrow(tt); mu <- 2
 nu <- ncol(tt)

#-----------------------------------------------------------------------
# Huber
#
    dfrpar(tt,"Huber")
    z <- airefq(tt, mu=mu, sigmx=1)
#.......................................................................
{
   cat(" airefq : Huber\n reff, beta, nit: ")
   cat(round(c(z$reff,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}
#-----------------------------------------------------------------------
# Krasker-Welsch
#
    dfrpar(tt,"kra-wel",upar=3.755)
    z <- airefq(tt, mu=mu, sigmx=1,init=1)
#.......................................................................
{
   cat(" airefq : Krasker-Welsch\n reff, beta, nit: ")
   cat(round(c(z$reff,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}
#-----------------------------------------------------------------------
# Mallows Standard
#
    dfrpar(tt,"Mal-Std",1.1*(mu+nu),1.569)
    z <- airefq(tt, mu=mu, sigmx=1,init=1)
#.......................................................................
{
   cat(" airefq : Mallows-Std\n reff, beta, nit: ")
   cat(round(c(z$reff,z$beta,z$nit),3),sep=c(", ",", ",", ","\n"))
}



#
# ---- Examples of Chapter 6: Robust testing in linear models ------
#

#=======================================================================
 tautest <- function(x,y,np,nq) {
# Full model. np variables in x[,1:np]
 n      <- nrow(x)
 z      <- riclls(x[,1:np], y)
 theta0 <- z$theta; sigma0 <- z$sigma; .dFv <- .dFvGet()
 z      <- liepsh(.dFv$ccc) # ccc is globally defined by dfrpar
 epsi2  <- z$epsi2; epsip <- z$epsip
 zc     <- ktaskv(x[,1:np],f=epsi2/(epsip^2))
 covi   <- zc$cov
 ribeth(y)
 zf     <- rywalg(x[,1:np],y,theta0,y,covi,sigmai=sigma0)
 thetaf <- zf$theta; sigma <- zf$sigmaf; rf <- zf$rs
 f      <- kffacv(rf,np=np,sigma=sigma)
 zc     <- ktaskv(x[,1:np],f=f$fh*(sigma^2)/n)
 cov    <- zc$cov
# Sub-model: nq variables in x[,1:nq], nq < np
 covi   <- cov[1:(nq*(nq+1)/2)]
 zs     <- rywalg(x[,1:nq], y, thetaf, y, covi, sigmai=sigma,isigma=0)
 thetas <- zs$theta; rs <- zs$rs
# Compute Tau-test statistic and P-value
 ztau   <- tftaut(rf,rs,y,rho,np,nq,sigma)
 ftau   <- ztau$ftau
 z      <- chisq(1,np-nq,ftau*epsip/epsi2)
 P      <- 1-z$p
#......................................................................
{
 cat(" F_tau, P, sigma: ")
 cat(round(c(ftau,P,sigma),3),sep=c(", ",", ","\n"))
 cat(" theta (small model): ",round(thetas[1:nq],3),"\n\n")
}
#......................................................................
 list(thetas=thetas[1:nq], sigma=sigma, rs=rs,ftau=ftau, P=P)}
#------------------------------------------------------------------------
 dshift <- function(x, theta, sigma, rs, nq) {
# Shift estimate d and confidence interval
 ncov   <- nq*(nq+1)/2
 f      <- kffacv(rs,np=nq,sigma=sigma)
 zc     <- ktaskv(x[,1:nq],f=f$fh)
 cov    <- zc$cov
 k11    <- 4.*cov[ncov-nq]
 k12    <- 2.*cov[ncov-1]
 k22    <- cov[ncov]
 za     <- quant(0.05/2)
 d      <- 2*theta[nq-1]/theta[nq]
 q      <- za$x*sigma/theta[nq]
 g      <- k22*(q^2)
 a      <- d-g*k12/k22
 b      <- abs(q)*sqrt(k11-2*d*k12+d*d*k22-g*(k11-k12*k12/k22))
 dL     <- (a-b)/(1-g)
 dU     <- (a+b)/(1-g)
#......................................................................
 cat(" d, dL, dU: ",round(c(d,dL,dU),3),sep=c("",", ",", ","\n"))
#......................................................................
 list(d=d, dL=dL, dU=dU)
}
#------------------------------------------------------------------------
 potcy  <- function(m,ml,mu,h,k,d,cs,ct) {
 fact   <- ((h*k) %% 2) + 1
 r      <- exp(log(d)*(fact*m+h-k)/2 - log(ct/cs))
 rl     <- exp(log(d)*(fact*ml+h-k)/2 - log(ct/cs))
 ru     <- exp(log(d)*(fact*mu+h-k)/2 - log(ct/cs))
 list(R=r, Rl=rl, Ru=ru)}
```

```
#-------------------------------------------------------------------------
 rbmost <- function(x,y,cc,usext=userfd) {
 n      <- nrow(x); np <- ncol(x); dfcomn(xk=np)
 .dFvPut(1,”itw”)
 z      <- wimedv(x)
 z      <- wyfalg(x, z$a, y, exu=usext); nitw <- z$nit
 wgt    <- 1/z$dist; wgt[wgt>1.e6] <- 1.e6
 z      <- comval()
 bto    <- z$bt0;    ipso   <- z$ipsi; co <- z$c
 z      <- ribet0(wgt, itype=2, isqw=0)
 xt     <- x*wgt;    yt     <- y * wgt
 z      <- rilars(xt, yt)
 theta0 <- z$theta;  sigma0 <- z$sigma
 rs     <- z$rs/wgt; r1     <- rs/sigma0
 dfcomn(ipsi=1,c=cc)
 z      <- liepsh(cc)
 den    <- z$epsip
 g      <- Psp(r1)/den # (see Psp in Chpt. 14)
 dfcomn(ipsi=ipso, c=co, bet0=bto)
 list(theta=theta0, sigma=sigma0, rs=rs, g=g, nitw=nitw)
}
#========================================================================
 dfvals()
 z <- c(-1, -2,  0,   35,         1,  0, -3,   20,
        -1, -2,  0,   30,         1,  0, -3,   39,
        -1, -2,  0,   24,         1,  0, -3,   16,
        -1, -2,  0,   37,         1,  0, -3,   27,
        -1, -2,  0,   28,         1,  0, -3,  -12,
        -1, -2,  0,   73,         1,  0, -3,    2,
        -1, -2,  0,   31,         1,  0, -3,   31,
        -1, -2,  0,   21,         1,  0, -1,   26,
        -1, -2,  0,   -5,         1,  0, -1,   60,
        -1,  0,  0,   62,         1,  0, -1,   48,
        -1,  0,  0,   67,         1,  0, -1,   -8,
        -1,  0,  0,   95,         1,  0, -1,   46,
        -1,  0,  0,   62,         1,  0, -1,   77,
        -1,  0,  0,   54,         1,  0,  1,   57,
        -1,  0,  0,   56,         1,  0,  1,   89,
        -1,  0,  0,   48,         1,  0,  1,  103,
        -1,  0,  0,   70,         1,  0,  1,  129,
        -1,  0,  0,   94,         1,  0,  1,  139,
        -1,  0,  0,   42,         1,  0,  1,  128,
        -1,  2,  0,  116,         1,  0,  1,   89,
        -1,  2,  0,  105,         1,  0,  1,   86,
        -1,  2,  0,   91,         1,  0,  3,  140,
        -1,  2,  0,   94,         1,  0,  3,  133,
        -1,  2,  0,  130,         1,  0,  3,  142,
        -1,  2,  0,   79,         1,  0,  3,  118,
        -1,  2,  0,  120,         1,  0,  3,  137,
        -1,  2,  0,  124,         1,  0,  3,   84,
        -1,  2,  0,   -8,         1,  0,  3,  101)
  xx    <- matrix(z,ncol=4, byrow=TRUE)
  dimnames(xx) <- list(NULL,c(”z2”,”xS”,”xT”,”y”))
  z2    <- xx[,"z2"]; xS <- xx[,"xS"]; xT <- xx[,"xT"]
  x     <- cbind(1, z2, xS+xT, xS-xT, xS^2+xT^2, xS^2-xT^2, xT^3)
  y     <- xx[,"y"]
  z     <- dfrpar(x, "huber",psipar=1.345)
#
#  Tau-test  and  shift estimate
#
{
  cat("Results (linearity test)\n")
  np    <- 7;   nq <- 4   # Test linearity
  z     <- tautest(x,y,np,nq)
  cat("Results (parallelism test)\n")
  np    <- 4;   nq <- 3  # Test parallelism
  z     <- tautest(x,y,np,nq)
  z     <- dshift(x, z$thetas, z$sigma, z$rs, nq)
}
#------------------------------------------------------------------------
# Input data; set defaults
#
  z <- c(35.3,  20,  10.98,
         29.7,  20,  11.13,
         30.8,  23,  12.51,
         58.8,  20,   8.40,
         61.4,  21,   9.27,
         71.3,  22,   8.73,
         74.4,  11,   6.36,
         76.7,  23,   8.50,
         70.7,  21,   7.82,
         57.5,  20,   9.14,
         46.4,  20,   8.24,
         28.9,  21,  12.19,
         28.1,  21,  11.88,
         39.1,  19,   9.57,
         46.8,  23,  10.94,
         48.5,  20,   9.58,
         59.3,  22,  10.09,
         70.0,  22,   8.11,
         70.0,  11,   6.83,
         74.5,  23,   8.88,
         72.1,  20,   7.68,
         58.1,  21,   8.47,
         44.6,  20,   8.86,
         33.4,  20,  10.36,
         28.6,  22,  11.08)
 x      <- matrix(z, ncol=3, byrow=TRUE)
 y      <- x[,3]; x[,2:3] <- x[,1:2]; x[,1] <- 1
 n      <- length(y); np <- ncol(x); nq <- np - 1
#
# Optimal tau-test based on Schweppe-type estimates
#
 z      <- tauare(itype=3,mu=1,cpsi=2.665,bb=0,sigmax=1)
 dfrpar(x, "Sch-Tau",upar=2.67); .dFvPut(1,"isg");
 .dFv   <- .dFvGet(); dfcomn(d=.dFv$ccc)
```

```
# Full model: initial estimates of theta, sigma and weights
 dfcomn(xk=np)  # Needed for userfd
 zr     <- rbmost(x,y,cc=1.5)
 theta0 <- zr$theta; sigma0 <- zr$sigma; nitw0 <- zr$nitw
#
# Initial and final values of weights
#
 z      <- wimedv(x)
 z      <- wyfalg(x, z$a, zr$g, nvarq=nq, igwt=1)
 wgt    <- 1/z$dist ; wgt[wgt>1.e6] <- 1.e6
# Full model: covariance matrix of coefficients and inverse
 z      <- kiedch(wgt)
 zc     <- ktaskw(x, z$d, z$e, f=1/n, iainv=1)
 cov    <- zc$cov; ainv <- zc$ainv
# Full model: Final estimate of theta and sigma
 ribeth(wgt)
 zf     <- rywalg(x, y,theta0,wgt,cov, sigmai=sigma0)
 thetaf <- zf$theta[1:np]; sigma <- zf$sigmaf; nitf <- zf$nit
# Small model: Final estimate of theta and sigma
 covi   <- cov[1:(nq*(nq+1)/2)]
 xt     <- x[,1:nq,drop=FALSE]
 zs     <- rywalg(xt, y, theta0, wgt, covi, sigmai=sigma, isigma=0)
 thetas <- zs$theta[1:nq]; nits <- zs$nit
# Compute Tau-test statistic
 ft     <- tftaut(zf$rs,zs$rs,wgt,rho,np,nq,sigma)
 ftau   <- ft$ftau
# P-value
 z      <- ttaskt(cov, ainv, np, nq, fact=n)
 z      <- tteign(z$covtau,nq)
 xlmbda <- z$xlmbda[1:(np-nq)]
 mult   <- rep(1, length=np)
 delta  <- rep(0, length=np)
 z      <- ruben(xlmbda, delta, mult,ftau, xmode=-1, maxit=100, eps=0.0001)
 P      <- 1-z$cumdf
#.......................................................................
{
 cat(” Optimal Tau-test : Schweppe-type estimates\n”)
 cat(” theta0: ”,round(theta0[1:np],3),"\n sigma0, nitw: ”)
 cat(round(c(sigma0,nitw0),3),sep=c(”, ”,"\n”))
 cat(” thetaf: ”,round(thetaf,3),"\n sigma, nit: ”)
 cat(round(c(sigma,nitf),3),sep=c(”, ”,"\n”))
 cat(” thetas: ”,round(thetas,3),"\n sigma, nit: ”)
 cat(round(c(sigma,nits),3),sep=c(”, ”,"\n”))
 cat(” F_tau =”,round(ftau,3),”, P =”,P,"\n”)
}
#=======================================================================
 rn2mal <- function(x,y,b2,c,nq) {
 n <- length(y); np <- ncol(x)
#
#  Rn2-test on Mallows estimators
#  ==============================
 dfrpar(x, ”mal-std”, b2, c)
 .dFvPut(1,”isg”); .dFv <- .dFvGet(); dfcomn(d=.dFv$ccc)
```

```
#
# Initial and final values of weights
#
 z     <- wimedv(x)
 z     <- wyfalg(x, z$a, wgt)
 wgt   <- Www(z$dist); nitw <- z$nit
#
# Initial theta and sigma (using weighted LAR)
#
 ribet0(wgt, isqw=0)
 xt    <- x*wgt
 yt    <- y * wgt
 z     <- rilars(xt, yt)
 theta0 <- z$theta; sigma0 <- z$sigma
#
# Initial value of COV
#
 z     <- kiedch(wgt)
 zc    <- ktaskw(x, z$d, z$e, f=1/n)
 covi  <- zc$cov
#
# Solution by means of RYWALG.
#
 z     <- ribeth(wgt)
 beta  <- z$bta
 zw    <- rywalg(x, y, theta0, wgt, covi, sigmai=sigma0)
 theta1 <- zw$theta[1:np]; sigma1 <- zw$sigmaf; nit1 <- zw$nit
#
# Unscaled covariance matrix of coefficients
#
  zc   <- kfedcb(wgt, zw$rs, sigma=sigma1)
  z    <- ktaskw(x, zc$d, zc$e, f=1/n)
  cov1 <- z$cov
#
# Rn2-test statistic and significance
#
 z     <- tfrn2t(cov1,theta1,n,nq)
 rn2m  <- z$rn2t/(n*sigma1^2)
 z     <- chisq(1,np-nq,rn2m)
 p1    <- 1.-z$p
 list(theta1=theta1, sigma1=sigma1, wgt=wgt, nitw=nitw, nit1=nit1,
      rn2m=rn2m, p1=p1)}
#------------------------------------------------------------------------
#
# Read data
#
  z <- c(35.3,  20,  10.98,
         29.7,  20,  11.13,
         30.8,  23,  12.51,
         58.8,  20,   8.40,
         61.4,  21,   9.27,
         71.3,  22,   8.73,
         74.4,  11,   6.36,
         76.7,  23,   8.50,
         70.7,  21,   7.82,
         57.5,  20,   9.14,
         46.4,  20,   8.24,
         28.9,  21,  12.19,
         28.1,  21,  11.88,
         39.1,  19,   9.57,
         46.8,  23,  10.94,
         48.5,  20,   9.58,
         59.3,  22,  10.09,
         70.0,  22,   8.11,
         70.0,  11,   6.83,
         74.5,  23,   8.88,
         72.1,  20,   7.68,
         58.1,  21,   8.47,
         44.6,  20,   8.86,
         33.4,  20,  10.36,
         28.6,  22,  11.08)
  x      <- matrix(z, ncol=3, byrow=TRUE)
  y      <- x[,3]; x[,2:3] <- x[,1:2];  x[,1] <- 1
  n      <- length(y); np <- ncol(x); nq <- np - 1
  wgt    <- vector("numeric",length(y))
  z      <- rn2mal(x, y, 4, 1.5, nq)
#.......................................................................
{
 cat("Rn2-test on Mallows estimators\n")
 cat(" theta1: ",round(z$theta1,3),"\n sigma1, nitw, nit1: ")
 cat(round(c(z$sigma1,z$nitw,z$nit1),3),sep=c(", ",", ","\n"))
 cat(" Rn2 =",round(z$rn2m,3),", P =",z$p1,"\n")
}


#
# ---- Examples of Chapter 7: Breakdown point regression ------
#

#
# Read data; load defaults
#
  z <- c(80, 27, 89, 42,
         80, 27, 88, 37,
         75, 25, 90, 37,
         62, 24, 87, 28,
         62, 22, 87, 18,
         62, 23, 87, 18,
         62, 24, 93, 19,
         62, 24, 93, 20,
         58, 23, 87, 15,
         58, 18, 80, 14,
         58, 18, 89, 14,
         58, 17, 88, 13,
         58, 18, 82, 11,
         58, 19, 93, 12,
        50, 18, 89,  8,
        50, 18, 86,  7,
        50, 19, 72,  8,
        50, 19, 79,  8,
        50, 20, 80,  9,
        56, 20, 82, 15,
        70, 20, 91, 15)
 x      <- matrix(z, ncol=4, byrow=TRUE)
 y      <- x[,4]; x[,4] <- 1
 n      <- length(y); np <- ncol(x)
 nq     <- np+1
 dfvals()
#
# Least median of squares
#
  zr     <- hylmse(x,y, nq, ik=1, iopt=3, intch=1)
  theta1 <- zr$theta; xmin1 <- zr$xmin
  zr     <- hylmse(x,y, nq, ik=2, iopt=3, intch=1)
  theta2 <- zr$theta; xmin2 <- zr$xmin
  zr     <- hylmse(x,y, nq, ik=1, iopt=1, intch=1)
  theta3 <- zr$theta; xmin3 <- zr$xmin

#
# Least trimmed squares
#
  zr     <- hyltse(x,y, nq, ik=1, iopt=3, intch=1)
  theta4 <- zr$theta; xmin4 <- zr$smin
  zr     <- hyltse(x,y, nq, ik=2, iopt=3, intch=1)
  theta5 <- zr$theta; xmin5 <- zr$smin
  zr     <- hyltse(x,y, nq, ik=1, iopt=1, intch=1)
  theta6 <- zr$theta; xmin6 <- zr$smin

#
# S-estimate
#
  z      <- dfrpar(x,'S')
  z      <- ribetu(y)
  zr     <- hysest(x,y, nq, iopt=3, intch=1)
  theta7 <- zr$theta[1:np]; xmin7 <- zr$smin
  zr     <- hysest(x,y, nq, iopt=1, intch=1)
  theta8 <- zr$theta[1:np]; xmin8 <- zr$smin
#.........................................................................
{
  cat("Results\n theta1 = (")
  cat(round(theta1,3),sep=", ")
  cat("), xmin1 ="); cat(round(xmin1,3))
  cat("\n theta2 = ("); cat(round(theta2,3),sep=", ")
  cat("), xmin2 ="); cat(round(xmin2,3))
  cat("\n theta3 = ("); cat(round(theta3,3),sep=", ")
  cat("), xmin3 ="); cat(round(xmin3,3))
  cat("\n theta4 = ("); cat(round(theta4,3),sep=", ")
  cat("), xmin4 ="); cat(round(xmin4,3))
  cat("\n theta5 = ("); cat(round(theta5,3),sep=", ")
  cat("), xmin5 ="); cat(round(xmin5,3))
  cat("\n theta6 = ("); cat(round(theta6,3),sep=", ")
  cat("), xmin6 ="); cat(round(xmin6,3))
  cat("\n theta7 = ("); cat(round(theta7,3),sep=", ")
  cat("), xmin7 ="); cat(round(xmin7,3))
  cat("\n theta8 = ("); cat(round(theta8,3),sep=", ")
  cat("), xmin8 ="); cat(round(xmin8,3),"\n")
}

#
# ---- Examples of Chapter 8: M-estimates of covariance matrices ------
#

#
# Read data; set defaults
#
  z <- c(4.37, 5.23,   4.38, 5.02,
         4.56, 5.74,   4.42, 4.66,
         4.26, 4.93,   4.29, 4.66,
         4.56, 5.74,   4.38, 4.90,
         4.30, 5.19,   4.22, 4.39,
         4.46, 5.46,   3.48, 6.05,
         3.84, 4.65,   4.38, 4.42,
         4.57, 5.27,   4.56, 5.10,
         4.26, 5.57,   4.45, 5.22,
         4.37, 5.12,   3.49, 6.29,
         3.49, 5.73,   4.23, 4.34,
         4.43, 5.45,   4.62, 5.62,
         4.48, 5.42,   4.53, 5.10,
         4.01, 4.05,   4.45, 5.22,
         4.29, 4.26,   4.53, 5.18,
         4.42, 4.58,   4.43, 5.57,
         4.23, 3.94,   4.38, 4.62,
         4.42, 4.18,   4.45, 5.06,
         4.23, 4.18,   4.50, 5.34,
         3.49, 5.89,   4.45, 5.34,
         4.29, 4.38,   4.55, 5.54,
         4.29, 4.22,   4.45, 4.98,
         4.42, 4.42,   4.42, 4.50,
         4.49, 4.85)
 cx      <- matrix(z, ncol=2, byrow=TRUE)
 n       <- nrow(cx); np <- ncol(cx)
 dst0    <- vector("numeric",n)
#-----------------------------------------------------------------------
# Classical covariance
#
  t0     <- apply(cx, 2, mean)
  xmb    <- sweep(cx, 2, t0)
  cv0    <- crossprod(xmb)/n
# Mahalanobis distances
  cvm1   <- solve(cv0)
  for (i in 1:n) {
      z  <- xmb[i,,drop=FALSE]; dst0[i] <- sqrt(z %*% cvm1 %*% t(z))}
```

```
#=========================================================================
# M-estimate of covariance
#
   zc    <- cicloc()
   za    <- cia2b2(nvar=np)
   a2    <- za$a2; b2 <- za$b2
   zd    <- cibeat(a2, b2, np)
   cw    <- zc$c;  dv <- zd$d
   dfcomn(iucv=1, a2=a2, b2=b2, bt=dv, cw=cw)
#  zf    <- cifact(a2,b2,np);  fc <- zf$fc
   z     <- cimedv(cx)
   ai    <- z$a; ti <- z$t; fc <- 1
#-------------------------------------------------------------------------
# With prescription F0
   zd    <- cyfalg(cx,ai,ti)
   zc    <- cfrcov(zd$a,np,fc)
   cv1   <- zc$cov; t1 <- zd$t; dst1 <- zd$dist; nt1 <- zd$nit
#-------------------------------------------------------------------------
# With prescription NH
   zd    <- cynalg(cx,ai,ti)
   zc    <- cfrcov(zd$a,np,fc)
   cv2   <- zc$cov; t2 <- zd$t; dst2 <- zd$dist; nt2 <- zd$nit
#-------------------------------------------------------------------------
# With prescription CG
   zd    <- cygalg(cx,ai,ti)
   zc    <- cfrcov(zd$a,np,fc)
   cv3   <- zc$cov; t3 <- zd$t; dst3 <- zd$dist; nt3 <- zd$nit
#.........................................................................
{
   cat("Results\n\n cv0[1,1],cv0[2,1],cv0[2,2] = (")
   cat(round(as.vector(cv0)[-2],3),sep=", ")
   cat(")\n t0 = ("); cat(round(t0,3),sep=", ")
   cat(")\n dist0 :\n ")
   cat(round(dst0,3),sep=c(rep(", ",9),",\n "))
   cat("\n cv1[1,1],cv1[2,1],cv1[2,2] = (")
   cat(round(cv1,3),sep=", ")
   cat(")\n t1 = ("); cat(round(t1,3),sep=", ")
   cat("), nit1 =",nt1); cat("\n dist1 :\n ")
   cat(round(dst1,3),sep=c(rep(", ",9),",\n "))
   cat("\n cv2[1,1],cv2[2,1],cv2[2,2] = (")
   cat(round(cv2,3),sep=", ")
   cat(")\n t2 = ("); cat(round(t2,3),sep=", ")
   cat("), nit2 =",nt2); cat("\n dist2 :\n ")
   cat(round(dst2,3),sep=c(rep(", ",9),",\n "))
   cat("\n cv3[1,1],cv3[2,1],cv3[2,2] = (")
   cat(round(cv3,3),sep=", ")
   cat(")\n t3 = ("); cat(round(t3,3),sep=", ")
   cat("), nit3 =",nt3); cat("\n dist3 :\n ")
   cat(round(dst3,3),sep=c(rep(", ",9),",\n "))
}
```

```
#
# ----------- Examples of Chapter 9: Mixed procedures --------------
#


 bindec <- function(np,ind,cpc,cpr) {
 n      <- length(ind)
 ccar   <- matrix("-",ncol=np, nrow=n)
 for (i in 1:n) {
    j   <- 0
    num <- abs(ind[i])
    while (num != 0 & j < np) {
     j   <- j+1
     if (num %% 2 == 1) ccar[i,j] <- "X"
     num <- num %/% 2}}
   data.frame(Cp=round(cpc,3),Cp.r=round(cpr,3),ipr=ind,i=ccar)
 }
#----------------------------------------------------------------------
# Read data
#
 z <- c(-1, -2,  0,   35,         1,  0, -3,   20,
        -1, -2,  0,   30,         1,  0, -3,   39,
        -1, -2,  0,   24,         1,  0, -3,   16,
        -1, -2,  0,   37,         1,  0, -3,   27,
        -1, -2,  0,   28,         1,  0, -3,  -12,
        -1, -2,  0,   73,         1,  0, -3,    2,
        -1, -2,  0,   31,         1,  0, -3,   31,
        -1, -2,  0,   21,         1,  0, -1,   26,
        -1, -2,  0,   -5,         1,  0, -1,   60,
        -1,  0,  0,   62,         1,  0, -1,   48,
        -1,  0,  0,   67,         1,  0, -1,   -8,
        -1,  0,  0,   95,         1,  0, -1,   46,
        -1,  0,  0,   62,         1,  0, -1,   77,
        -1,  0,  0,   54,         1,  0,  1,   57,
        -1,  0,  0,   56,         1,  0,  1,   89,
        -1,  0,  0,   48,         1,  0,  1,  103,
        -1,  0,  0,   70,         1,  0,  1,  129,
        -1,  0,  0,   94,         1,  0,  1,  139,
        -1,  0,  0,   42,         1,  0,  1,  128,
        -1,  2,  0,  116,         1,  0,  1,   89,
        -1,  2,  0,  105,         1,  0,  1,   86,
        -1,  2,  0,   91,         1,  0,  3,  140,
        -1,  2,  0,   94,         1,  0,  3,  133,
        -1,  2,  0,  130,         1,  0,  3,  142,
        -1,  2,  0,   79,         1,  0,  3,  118,
        -1,  2,  0,  120,         1,  0,  3,  137,
        -1,  2,  0,  124,         1,  0,  3,   84,
        -1,  2,  0,   -8,         1,  0,  3,  101)
  xx    <- matrix(z,ncol=4, byrow=TRUE)
  dimnames(xx) <- list(NULL,c("z2","xS","xT","y"))
  z2    <- xx[,"z2"]; xS <- xx[,"xS"]; xT <- xx[,"xT"]
  x     <- cbind(1, z2, xS+xT, xS-xT, xS^2+xT^2, xS^2-xT^2, xT^3)
  y     <- xx[,"y"]
  wgt   <- vector(”numeric”,length(y))
  n     <- 56; np <- 7
 dfvals()
# Compute classical sigma and the t-statistics
 dfrpar(x,”ols”,-1,-1); .dFv   <- .dFvGet()
 z     <- mirtsr(x,y,.dFv$ite)
 sigmc <- z$sigma; tstac <- z$t

# Compute robust sigma and the t-statistics
 dfrpar(x,”huber”,-1,-1); .dFv   <- .dFvGet()
 z     <- mirtsr(x,y,.dFv$ite)
 sigmr <- z$sigma; tstar <- z$t
#
# All possible regressions including  the constant and linear terms
#
 vp     <- rep(-0.5, length=np)
 vp[1]  <- 3; vp[3]  <- 2; vp[4]  <- 1
 za     <- mfragr(x, y, vp, nc=18, .dFv$ite, sigmac=sigmc, sigmar=sigmr)
#
# Priorites by means of t-directed search
#
 zt     <- mfragr(x, y, tstar, nc=7, .dFv$ite, sigmac=sigmc, sigmar=sigmr)
#.......................................................................
{
 cat(” Estimates of sigma\n ”)
 cat(” sigmc =”,round(sigmc,3),”, sigmr =”,round(sigmr,3),”\n”)
 cat(” Regressions on subset of variables:\n”)
 cat(”  C{p} C{p,@} ipr 1 2 3 4 5 6 7\n”)
 cat(t(bindec(np,za$ipr,za$cpc,za$cpr)),sep=c(rep(” ”,9),”\n”))
 cat(”\n t-directed search\n”)
 cat(” tstar[1:7]=(”, round(tstar,3),sep=c(””,rep(”, ”,6)))
 cat(”)\n   C_p C{p,@} ipr 1 2 3 4 5 6 7\n”)
 cat(t(bindec(np,zt$ipr,zt$cpc,zt$cpr)),sep=c(rep(” ”,9),”\n”))
}
#=======================================================================
#
# Read data; set defaults
#
  z <- c(4.37, 5.23,   4.48, 5.42,   4.38, 5.02,   4.53, 5.10,
         4.56, 5.74,   4.01, 4.05,   4.42, 4.66,   4.45, 5.22,
         4.26, 4.93,   4.29, 4.26,   4.29, 4.66,   4.53, 5.18,
         4.56, 5.74,   4.42, 4.58,   4.38, 4.90,   4.43, 5.57,
         4.30, 5.19,   4.23, 3.94,   4.22, 4.39,   4.38, 4.62,
         4.46, 5.46,   4.42, 4.18,   3.48, 6.05,   4.45, 5.06,
         3.84, 4.65,   4.23, 4.18,   4.38, 4.42,   4.50, 5.34,
         4.57, 5.27,   3.49, 5.89,   4.56, 5.10,   4.45, 5.34,
         4.26, 5.57,   4.29, 4.38,   4.45, 5.22,   4.55, 5.54,
         4.37, 5.12,   4.29, 4.22,   3.49, 6.29,   4.45, 4.98,
         3.49, 5.73,   4.42, 4.42,   4.23, 4.34,   4.42, 4.50,
         4.43, 5.45,   4.49, 4.85,   4.62, 5.62)
 cx      <- matrix(z, ncol=2, byrow=TRUE)
 n       <- nrow(cx); np <- ncol(cx)
 y       <- vector(”numeric”,length=n)
```

```
#
# Minimum Volume Ellipsoid covariances
#
 dfvals(); .dFv   <- .dFvGet()
 z       <- mymvlm(cx,y,ilms=0,iopt=3,iseed=5321)
 dst     <- z$d;  cv <- z$cov; xvol <- z$xvol
#.........................................................................
{
 cat("Minimum Volume Ellipsoid covariances\n cv = (")
 cat(round(cv,3),sep=c(", ",", "))
 cat("), Objective function value =",round(xvol,3),"\ndistances:\n")
 cat(round(dst,3),sep=c(rep(", ",9),",\n"))
}
#=========================================================================
#
# Read data; load defaults
#
  z <- c(80, 27, 89, 42,
         80, 27, 88, 37,
         75, 25, 90, 37,
         62, 24, 87, 28,
         62, 22, 87, 18,
         62, 23, 87, 18,
         62, 24, 93, 19,
         62, 24, 93, 20,
         58, 23, 87, 15,
         58, 18, 80, 14,
         58, 18, 89, 14,
         58, 17, 88, 13,
         58, 18, 82, 11,
         58, 19, 93, 12,
         50, 18, 89,  8,
         50, 18, 86,  7,
         50, 19, 72,  8,
         50, 19, 79,  8,
         50, 20, 80,  9,
         56, 20, 82, 15,
         70, 20, 91, 15)
 x       <- matrix(z, ncol=4, byrow=TRUE)
 y       <- x[,4]; x[,4] <- 1
 n       <- length(y); np <- ncol(x)
 nq      <- np+1
 dfvals()
#
# High breakdown point & high efficiency regression
#
 dfrpar(x,"S",-1,-1)
 z <- myhbhe(x, y, iseed=5431)
#.........................................................................
{
 cat("High breakdown point & high efficiency regression\n")
 cat(" theta0 = ("); cat(round(z$theta0,3),sep=", ")
 cat("), sigma0 =",round(z$sigm0,3))
 cat("\n theta1 = ("); cat(round(z$theta1,3),sep=", ")
 cat("), sigma1 = ",round(z$sigm1,3),", tbias =",sep="")
 cat(round(z$tbias,3),"\n")
}


#
# -------- Examples of Chapter 10: M-estimates for discrete GLM ---------
#

 glmb <- function(x,y,n,np,upar) {
#
# BI estimates of theta, A, ci and wa: Bernouilli responses, b=upar
#
# Initial theta, A (A0) and c (c0)
#
 ni     <- rep.int(1,n)
 z      <- gintac(x,y,ni,icase=1,b=upar,c=1.5)
 theta0 <- z$theta[1:np]; A0 <- z$a; c0 <- z$ci
# Initial distances |Ax_i| and cut off points a_i (wa)
 wa     <- upar/z$dist
 vtheta <- x %*% theta0
 z      <- gfedca(vtheta, c0, wa, ni, icase=1)
 zc     <- ktaskw(x, z$d, z$e, f=1/n)      # See Chpt. 4
 covi   <- zc$cov
# Final theta, A, c (ci) and a (wa)
 z      <- gymain(x, y, ni, covi, A0, theta0, b = upar)
 theta  <- z$theta; A <- z$a; ci <- z$ci; wa <- z$wa; nit <- z$nit
# Final cov. matrix and std. dev's of coeff. estimates
 z      <- gfedca(z$vtheta, ci, wa, ni, icase=1)
 sdev   <- NULL
 zc     <- ktaskw(x, z$d, z$e, f=1/n)
 for (i in 1:np) {ii <- i*(i+1)/2; sdev <- c(sdev,zc$cov[ii])}
 sdev   <- sqrt(sdev)
 list(theta=theta, A=A, ci=ci, wa=wa, nit=nit, sdev=sdev)}
#-----------------------------------------------------------------------
# Read data; load defaults
#
  z <- c(3.70, 0.825, 1,   3.50, 1.090, 1,
         1.25, 2.500, 1,   0.75, 1.500, 1,
         0.80, 3.200, 1,   0.70, 3.500, 1,
         0.60, 0.750, 0,   1.10, 1.700, 0,
         0.90, 0.750, 0,   0.90, 0.450, 0,
         0.80, 0.570, 0,   0.55, 2.750, 0,
         0.60, 3.000, 0,   1.40, 2.330, 1,
         0.75, 3.750, 1,   2.30, 1.640, 1,
         3.20, 1.600, 1,   0.85, 1.415, 1,
         1.70, 1.060, 0,   1.80, 1.800, 1,
         0.40, 2.000, 0,   0.95, 1.360, 0,
         1.35, 1.350, 0,   1.50, 1.360, 0,
         1.60, 1.780, 1,   0.60, 1.500, 0,
         1.80, 1.500, 1,   0.95, 1.900, 0,
         1.90, 0.950, 1,   1.60, 0.400, 0,
         2.70, 0.750, 1,   2.35, 0.300, 0,
         1.10, 1.830, 0,   1.10, 2.200, 1,
         1.20, 2.000, 1,   0.80, 3.330, 1,
         0.95, 1.900, 0,   0.75, 1.900, 0,
         1.30, 1.625, 1)
 x     <- matrix(z, ncol=3, byrow=TRUE)
 y     <- x[,3]; x[,3] <- log(x[,2]); x[,2] <- log(x[,1]) ; x[,1] <- 1
 n     <- length(y); np <- ncol(x)
 dfvals()
 upar  <- 3.2*sqrt(np)
 z1    <- glmb(x,y,n,np,upar)

 upar  <- 3.7*sqrt(np)
 z2    <- glmb(x,y,n,np,upar)

 z     <- glmb(x,y,n,np,300) # Classical estimates
#.........................................................................
{
 cat("\n Robust estimates : upar=5.5426, nit =",z1$nit,"\n")
 cat(" {theta[i] (sdev[i]), i=1:3}\n ")
 for (i in 1:3) cat(round(z1$theta[i],3)," (",round(z1$sdev[i],3),")  ",sep="")
 cat("\n\n Robust estimates : upar=6.4086, nit =",z2$nit,"\n")
 cat(" {theta[i] (sdev[i]), i=1:3}\n ")
 for (i in 1:3) cat(round(z2$theta[i],3)," (",round(z2$sdev[i],3),")  ",sep="")
 cat("\n\n Classical estimates : upar=300, nit =",z$nit,"\n")
 cat(" {theta[i] (sdev[i]), i=1:3}\n ")
 for (i in 1:3) cat(round(z$theta[i],3)," (",round(z$sdev[i],3),")  ",sep="")
 cat("\n")
}
#-------------------------------------------------------------------------
```

addc *Adds a column vector to a transformed design matrix and updates its QR-decomposition*

Description

See Marazzi A. (1993), p.355

Usage

```
addc(x, n = nrow(x), l, j, ip)
```

Arguments

x	See reference
n	See reference
l	See reference

j	See reference
ip	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.355

---

airef0 *Asymptotic relative efficiency of a general M-estimate for a model with mu quantitative covariates with or without a constant term*

Description

See Marazzi A. (1993), p.167

Usage

```
airef0(expsi = psi, exu = ucv, exw = www, itype = .dFvGet()$ite, mu,
       ialfa = .dFvGet()$ial, sigmx = 1, upper = .dFvGet()$upr,
       til = .dFvGet()$tli, maxit = .dFvGet()$mxe, tol = .dFvGet()$tlo)
```

Arguments

expsi	See reference
exu	See reference
exw	See reference
itype	See reference
mu	See reference
ialfa	See reference
sigmx	See reference
upper	See reference
til	See reference
maxit	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.167

---

airefq — *Asymptotic relative efficiency of a general M-estimate for a model with mu quantitative and nu qualitative covariates*

Description

See Marazzi A. (1993), p.170

Usage

```
airefq(t, expsi = psi, exu = ucv, exw = www, itype = .dFvGet()$ite, mu, sigmx = 1,
     upper = .dFvGet()$upr, til = .dFvGet()$tli, tau = .dFvGet()$tua, nobs = nrow(t),
       maxit = .dFvGet()$mxe, tol = .dFvGet()$tlo, init = .dFvGet()$ini,
       nitmon = .dFvGet()$ntm)
```

Arguments

`t`	See reference
`expsi`	See reference
`exu`	See reference
`exw`	See reference
`itype`	See reference
`mu`	See reference
`sigmx`	See reference
`upper`	See reference
`til`	See reference
`tau`	See reference
`nobs`	See reference
`maxit`	See reference
`tol`	See reference
`init`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.170

binprd *Binomial probability distribution*

Description

See Marazzi A. (1993), p.367

Usage

```
binprd(k, n, p)
```

Arguments

k	See reference
n	See reference
p	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.367

cerf *Complemented error function (single precision)*

Description

See Marazzi A. (1993), p.380

Usage

```
cerf(x)
```

Arguments

x	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.380

`cerfd` *Complemented error function (double precision)*

Description

See Marazzi A. (1993), p.380

Usage

```
cerfd(x)
```

Arguments

`x`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.380

`cfrcov` *Computation of fC.fC.inv(AT A) for a given matrix A and scale factor fC*

Description

See Marazzi A. (1993), p.242

Usage

```
cfrcov(a, nvar, fc, tau = .dFvGet()$tua)
```

Arguments

`a`	See reference
`nvar`	See reference
`fc`	See reference
`tau`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.242

`Chi` *Chi weight function for location and regression*

Description

See Marazzi A. (1993), p.322

Usage

```
Chi(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the chi function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.32

`chi` *Chi weight function for location and regression*

Description

See Marazzi A. (1993), p.322

Usage

```
chi(s)
```

Arguments

`s`	A scalar input value

Value

The value of the chi function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.322

`chisq` *Cumulative Chi-square distribution function*

Description

See Marazzi A. (1993), p.373

Usage

```
chisq(kode = 1, ifn, x)
```

Arguments

`kode`	See reference
`ifn`	See reference
`x`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.373

cia2b2 *Determination of the parameters a2 and b2 of the Huber weight function from the proportion eps of contamination*

Description

See Marazzi A. (1993), p.244

Usage

```
cia2b2(eps = .dFvGet()$esp, nvar, tol = .dFvGet()$tlo, maxit = .dFvGet()$mxt)
```

Arguments

`eps`	See reference
`nvar`	See reference
`tol`	See reference
`maxit`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.244

cibeat *Determination of the parameter d of the Huber weight function*

Description

See Marazzi A. (1993), p.247

Usage

```
cibeat(a2 = .dFvGet()$aa2, b2 = .dFvGet()$bb2, nvar)
```

Arguments

`a2`	See reference
`b2`	See reference
`nvar`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.247

---

cicloc *Determination of the parameter c of the Huber weight function from the proportion eps of contamination*

Description

See Marazzi A. (1993), p.243

Usage

```
cicloc(eps = .dFvGet()$esp, tol = .dFvGet()$tlo)
```

Arguments

eps	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.243

cifact *Determination of the correction factor for the M-estimate based on Huber weight function*

Description

See Marazzi A. (1993), p.246

Usage

```
cifact(a2 = .dFvGet()$aa2, b2 = .dFvGet()$bb2, nvar, tol = .dFvGet()$tlo,
       maxit = .dFvGet()$mxt)
```

Arguments

a2	See reference
b2	See reference
nvar	See reference
tol	See reference
maxit	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.246

cimedv *Initial values for the iterative algorithms implemented in CYFALG, CYNALG, and CYGALG*

Description

See Marazzi A. (1993), p.230

Usage

```
cimedv(x, nobs = nrow(x), nfirst = nobs, iloc = .dFvGet()$ilc, t)
```

Arguments

`x`	See reference
`nobs`	See reference
`nfirst`	See reference
`iloc`	See reference
`t`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.230

`cirock` *Initial values for the Rocke estimates of covariance*

Description

See Marazzi A. (1993), p.223

Usage

```
cirock(nvar, em = .dFvGet()$em, cr = .dFvGet()$cr, iopt = 1)
```

Arguments

`nvar`	See the description of `nvar` as indicated above
`em`	See the description of `em` as indicated above
`cr`	See the description of `cr` as indicated above
`iopt`	See the description of `iopt` as indicated above

Author(s)

Rocke and Downs (1981)

References

https://www.ubc.ca/search/?q=rocke#gsc.tab=0&gsc.q=rocke&gsc.page=1 - Marazzi A. (1993), *Algorithm, Routines, and S functions for Robust Statistics*, Wadsworth & Brooks/cole, Pacific Grove, California, p.223

`comval` *Gives the current values ofthe parameters of the ROBETH subroutine common blocks*

Description

See Marazzi A. (1993), p.405

Usage

```
comval()
```

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.405

`cquant` *Inverse of the cumulative Chi2-distribution function*

Description

See Marazzi A. (1993), p.374

Usage

```
cquant(p, ifn, tol = 5e-06, maxit = 50)
```

Arguments

`p`	See reference
`ifn`	See reference
`tol`	See reference
`maxit`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.374

cyfalg *Fixed-point algorithm for the computation of an M-estimate of multivariate location and scatter*

Description

See Marazzi A. (1993), p.232

Usage

```
cyfalg(x, a, t, exu = ucv, exv = vcv, exw = wcv, nobs = nrow(x), tau = .dFvGet()$tua,
       maxit = .dFvGet()$mxf, nitmon = .dFvGet()$ntm, iloc = .dFvGet()$ilc,
       icnv = .dFvGet()$icv, tol = .dFvGet()$tlo)
```

Arguments

x	See reference
a	See reference
t	See reference
exu	See reference
exv	See reference
exw	See reference
nobs	See reference
tau	See reference
maxit	See reference
nitmon	See reference
iloc	See reference
icnv	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.232

cygalg *Conjugate gradient algorithm for the computation of an M-estimate of multivariate location and scatter*

Description

See Marazzi A. (1993), p.238

Usage

```
cygalg(x, a, t, exu = ucv, exup = upcv, exv = vcv, exw = wcv, exwp = wpcv,
       nobs = nrow(x), maxit = .dFvGet()$mxg, nitmon = .dFvGet()$ntm,
       iloc = .dFvGet()$ilc, icnv = .dFvGet()$icv, tol = .dFvGet()$tlo,
       xfud = .dFvGet()$xfd)
```

Arguments

`x`	See reference
`a`	See reference
`t`	See reference
`exu`	See reference
`exup`	See reference
`exv`	See reference
`exw`	See reference
`exwp`	See reference
`nobs`	See reference
`maxit`	See reference
`nitmon`	See reference
`iloc`	See reference
`icnv`	See reference
`tol`	See reference
`xfud`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.238

cynalg *Newton-type algorithm for the computation of an M-estimate of multivariate location and scatter*

Description

See Marazzi A. (1993), p.235

Usage

```
cynalg(x, a, t, exu = ucv, exup = upcv, exv = vcv, exvp = vpcv,
       exw = wcv, exwp = wpcv, nobs = nrow(x), maxit = .dFvGet()$mxn,
       nitmon = .dFvGet()$ntm, iloc = .dFvGet()$ilc, icnv = .dFvGet()$icv,
       tol = .dFvGet()$tlo, xfud = .dFvGet()$xfd)
```

Arguments

x	See reference
a	See reference
t	See reference
exu	See reference
exup	See reference
exv	See reference
exvp	See reference
exw	See reference
exwp	See reference
nobs	See reference
maxit	See reference
nitmon	See reference
iloc	See reference
icnv	See reference
tol	See reference
xfud	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.235

Dbinom *Diagonal matrix D for the binomial case in discrete GLM*

Description

See Marazzi A. (1993), p.310

Usage

```
Dbinom(y, ci, vtheta, wa, ni, f0, oi = 0, kap = 1e-06)
```

Arguments

y	See reference
ci	See reference
vtheta	See reference
wa	See reference
ni	See reference
f0	See reference
oi	See reference
kap	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.310

dfcomn *Assigns values to the ROBETH parameters included in common blocks*

Description

See Marazzi A. (1993), p.405

Usage

```
dfcomn(ipsi = -9, c = -1.345, h1 = -1.7, h2 = -3.4, h3 = -8.5,
       xk = -1.548, d = -1.345, beta = -0.5, bet0 = -1, iucv = -1,
       a2 = 0, b2 = -3, chk = -9, ckw = -2, bb = -1, bt = -1,
       cw = -1, em = -1.345, cr = -2, vk = -1, np = -2, nu = -1,
       v7 = -1, iwww = -1)
```

Arguments

`ipsi`	Option parameter for the choice of ψ. Set -4 <= ipsi <= 4
`c`	Parameter c of the Huber function
`h1`	Parameter $h1$ of the Hampel function
`h2`	Parameter $h2$ of the Hampel function
`h3`	Parameter $h3$ of the Hampel function
`xk`	Parameter k of the rescaled Tukey biweight
`d`	See reference
`beta`	Parameter β to makeσ estimate asymptotically unbiased
`bet0`	Parameter β_0 to makeσ estimate asymptotically unbiased
`iucv`	Option parameter for the choice of u(s), u'(s), v(s), v'(s), w(s) or w'(s)
`a2`	Parameter a^2 of Huber's mimimax u-function
`b2`	Parameter b^2 of Huber's mimimax u-function
`chk`	Parameter c of the Hampel-Krasker u-function
`ckw`	Parameter c of the Krasker-Welsch u-function
`bb`	Parameter b of the Mallows-unstandard u-function
`bt`	Option parameter for w(s) or w'(s)
`cw`	Option parameter for w(s) or w'(s)
`em`	Parameter em for unstandard u-function
`cr`	Parameter cr for unstandard u-function
`vk`	Parameter vk for unstandard u-function
`np`	Parameter np for unstandard u-function
`nu`	Parameter nu for unstandard u-function
`v7`	Parameter v for unstandard u-function
`iwww`	Option parameter for the choice of $\bar{\omega}$. Set 0 <= iwww <= 3

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.405

`dfrpar` *Sets default parameters for regression estimates*

Description

See Marazzi A. (1993), p.398 and p.406

Usage

```
dfrpar(x, etype, upar = -1, psipar = -1)
```

Arguments

`x`	See reference
`etype`	See reference
`upar`	See reference
`psipar`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.398 and p.406

`dfvals` *Provide default values for most scalar parameters used by the Robeth subroutines*

Description

See Marazzi A. (1993), p.404

Usage

```
dfvals()
```

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.404

dotp *Forms the scalar (dot) product of two vectors*

Description

See Marazzi A. (1993), p.350

Usage

```
dotp(x, y, n = nrow(x), incx = 1, incy = 1)
```

Arguments

`x`	See reference
`y`	See reference
`n`	See reference
`incx`	See reference
`incy`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.350

dotpd *Forms the scalar (dot) product of two vectors (double precision)*

Description

See Marazzi A. (1993), p.350

Usage

```
dotpd(x, y, n = nrow(x), incx = 1, incy = 1)
```

Arguments

`x`	See reference
`y`	See reference
`n`	See reference
`incx`	See reference
`incy`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.350

---

dpoiss *Diagonal matrix D for the Poisson case in discrete GLM*

Description

See Marazzi A. (1993), p.312

Usage

```
dpoiss(y, ci, vtheta, wa, f0, oi = 0, kap = 1e-06)
```

Arguments

`y`	See reference
`ci`	See reference
`vtheta`	See reference
`wa`	See reference
`f0`	See reference
`oi`	See reference
`kap`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.31

exch *Exchanges two columns of a symmetric matrix*

Description

See Marazzi A. (1993), p.364

Usage

```
exch(s, n, h, k)
```

Arguments

s	See reference
n	See reference
h	See reference
k	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.364

exchd *Exchanges two columns of a symmetric matrix (double precision)*

Description

See Marazzi A. (1993), p.364

Usage

```
exchd(s, n, h, k)
```

Arguments

s	See reference
n	See reference
h	See reference
k	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.364

`fcum` *Cumulative F-distribution function*

Description

See Marazzi A. (1993), p.379

Usage

```
fcum(n1, n2, x)
```

Arguments

`n1`	See reference
`n2`	See reference
`x`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.37

`Fn.Exp.f` *Parametric estimate of survival cdf*

Description

Parametric estimate of survival cdf

Usage

```
Fn.Exp.f(z, y , delta, mu, sigma, lambda, zero=1e-4)
```

Arguments

`z`	See reference
`y`	See reference
`delta`	See reference
`mu`	See reference
`sigma`	See reference
`lambda`	See reference
`zero`	See reference

Value

See reference

References

Marazzi A. (2010) Robust estimation of the extended log-gamma (not yet published)

`fstord` *Determination of the j-th order statistic*

Description

See Marazzi A. (1993), p.389

Usage

```
fstord(y, j)
```

Arguments

`y`	See reference
`j`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.389

gauss *Cumulative Gaussian distribution function*

Description

See Marazzi A. (1993), p.371

Usage

```
gauss(kode = 1, x)
```

Arguments

kode	See reference
x	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.371

gaussd *Cumulative Gaussian distribution function (double precision)*

Description

See Marazzi A. (1993), p.371

Usage

```
gaussd(kode = 1, x)
```

Arguments

kode	See reference
x	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.371

---

gfedca *Diagonal matrices D_G and E_G*

Description

See Marazzi A. (1993), p.309

Usage

```
gfedca(vtheta, ci, wa, ni, oi = 0, icase = .dFvGet()$ics)
```

Arguments

vtheta	See reference
ci	See reference
wa	See reference
ni	See reference
oi	See reference
icase	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.309

gintac *Initial values of theta, A and c_i,...,c_n*

Description

See Marazzi A. (1993), p.292

Usage

```
gintac(x, y, ni, oi = 0, icase = .dFvGet()$ics, maxtt = .dFvGet()$mxt,
       maxta = .dFvGet()$mxf, tolt = .dFvGet()$tlo, tola = .dFvGet()$tlo,
       b = 1.1 * sqrt(np), c = 1.345)
```

Arguments

x	See reference
y	See reference
ni	See reference
oi	See reference
icase	See reference
maxtt	See reference
maxta	See reference
tolt	See reference
tola	See reference
b	See reference
c	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.292

glmdev *The total deviance of the fitted generalizrd linear model*

Description

Computes the sum of the vector deviance and other intermediate results

Usage

```
glmdev(y, ni, ci, wa, vtheta, offset = 0, icase = .dFvGet()$ics)
```

Arguments

`y`	The vector of observations
`ni`	The number of trial at xi in the binomial case (ics=2). Otherwise ni=1 for each xi.
`ci`	The constants ci
`wa`	The vector of ai=b/|Axi|
`vtheta`	The vector of xi^T
`offset`	Optional offset added to the linear predictor.
`icase`	Set ics=1 for Bernoulli case, ics=2 for Binomial case and ics=3 for Poisson case

Value

A list with the following components:

`dev`	2*sum_i abs(Li-Ti)
`thetas`	The estimates of theta_i
`li`	The values of Li
`sc`	The alues of Ti

References

Kuensch, H.R., Stefanski L.A., Carroll R.J. (1989). Conditionally unbiased bounded-influence estimation in general regression models, with application to generalized linear models. Journal of the American Statistical Association, 84, 460-466.

Marazzi, A. (1993). Algorithms, Routines, and S-functions for robust Statistics. Chapman and Hall, New York.

Marazzi A. (1997). Object oriented S-plus functions for robust discrete generalized linear models available in the doc folder of this package.

gyastp *Fixed-point algorithm for the A-step*

Description

See Marazzi A. (1993), p.301

Usage

```
gyastp(x, y, ni, vtheta, ci, a, oi = 0, b = 1.1 * sqrt(nvar),
       iugl = .dFvGet()$iug, icase = .dFvGet()$ics, tau = .dFvGet()$tua,
       maxit = .dFvGet()$mxf, nitmon = .dFvGet()$ntm, icnv = .dFvGet()$icv,
       tol = .dFvGet()$tlo)
```

Arguments

`x`	See reference
`y`	See reference
`ni`	See reference
`vtheta`	See reference
`ci`	See reference
`a`	See reference
`oi`	See reference
`b`	See reference
`iugl`	See reference
`icase`	See reference
`tau`	See reference
`maxit`	See reference
`nitmon`	See reference
`icnv`	See reference
`tol`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.301

gycstp *Newton-type algorithm for the c-step*

Description

See Marazzi A. (1993), p.299

Usage

```
gycstp(icase = .dFvGet()$ics, ialg = .dFvGet()$ilg, ni, a, e,
        tol = .dFvGet()$tlo, maxit = .dFvGet()$mxt, t)
```

Arguments

icase	See reference
ialg	See reference
ni	See reference
a	See reference
e	See reference
tol	See reference
maxit	See reference
t	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.299

gymain *Main algorithm*

Description

See Marazzi A. (1993), p.304

Usage

```
gymain(x, y, ni, cov, a, theta, oi = 0, b = 1.1 * sqrt(np),
       gam = .dFvGet()$gma, tau = .dFvGet()$tua, icase = .dFvGet()$ics,
       iugl = .dFvGet()$iug, iopt = .dFvGet()$ipo, ialg = .dFvGet()$ilg,
       icnvt = .dFvGet()$icn, icnva = .dFvGet()$icv, maxit = .dFvGet()$mxx,
       maxtt = .dFvGet()$mxt, maxta = .dFvGet()$mxf, maxtc = .dFvGet()$mxt,
       nitmnt = .dFvGet()$ntm, nitmna = .dFvGet()$ntm, tol = .dFvGet()$tlo,
       tolt = .dFvGet()$tlo * 10, tola = .dFvGet()$tlo * 10,
       tolc = .dFvGet()$tlo * 10)
```

Arguments

x	See reference
y	See reference
ni	See reference
cov	See reference
a	See reference
theta	See reference
oi	See reference
b	See reference
gam	See reference
tau	See reference
icase	See reference
iugl	See reference
iopt	See reference
ialg	See reference
icnvt	See reference
icnva	See reference
maxit	See reference
maxtt	See reference
maxta	See reference
maxtc	See reference
nitmnt	See reference
nitmna	See reference
tol	See reference
tolt	See reference
tola	See reference
tolc	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.304

gytstp *Newton-type algorithm for the theta-step*

Description

See Marazzi A. (1993), p.295

Usage

```
gytstp(x, y, ci, theta, wa, cov, ni, oi = 0, gam = .dFvGet()$gma,
       tol = .dFvGet()$tlo, tau = .dFvGet()$tua, iopt = .dFvGet()$ipo,
       icase = .dFvGet()$ics, icnv = .dFvGet()$icn, maxit = .dFvGet()$mxt,
       nitmon = .dFvGet()$ntm)
```

Arguments

`x`	See reference
`y`	See reference
`ci`	See reference
`theta`	See reference
`wa`	See reference
`cov`	See reference
`ni`	See reference
`oi`	See reference
`gam`	See reference
`tol`	See reference
`tau`	See reference
`iopt`	See reference
`icase`	See reference
`icnv`	See reference
`maxit`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.295

h12 *Constructs and/or applies a single elementary Householder transformation*

Description

See Marazzi A. (1993), p.359

Usage

```
h12(mode, lpivot, l1, u, up, c, ice, icv, ncv)
```

Arguments

`mode`	See reference
`lpivot`	See reference
`l1`	See reference
`u`	See reference
`up`	See reference
`c`	See reference
`ice`	See reference
`icv`	See reference
`ncv`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.359

h12d *Constructs and/or applies a single elementary Householder transformation (double precision)*

Description

See Marazzi A. (1993), p.359

Usage

```
h12d(mode, lpivot, l1, u, up, c, ice, icv, ncv)
```

Arguments

mode	See reference
lpivot	See reference
l1	See reference
u	See reference
up	See reference
c	See reference
ice	See reference
icv	See reference
ncv	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.35

hylmse *Resampling algorithm for the computation of the LMS estimate*

Description

See Marazzi A. (1993), p.208

Usage

```
hylmse(x, y, nq = np, ik = .dFvGet()$ik1, iopt = .dFvGet()$ipt,
       intch = .dFvGet()$ich, nrep, tol = .dFvGet()$tlo, tau = .dFvGet()$tua,
       iseed = .dFvGet()$isd)
```

Arguments

x	See reference
y	See reference
nq	See reference
ik	See reference
iopt	See reference
intch	See reference
nrep	See reference
tol	See reference
tau	See reference
iseed	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.208

---

hyltse *Resampling algorithm for the computation of the LTS estimate*

Description

See Marazzi A. (1993), p.212

Usage

```
hyltse(x, y, nq = np, ik = .dFvGet()$ik1, iopt = .dFvGet()$ipt,
       intch = .dFvGet()$ich, nrep, tol = .dFvGet()$tlo, tau = .dFvGet()$tua,
       iseed = .dFvGet()$isd, smin)
```

Arguments

x	See reference
y	See reference
nq	See reference
ik	See reference
iopt	See reference
intch	See reference
nrep	See reference
tol	See reference
tau	See reference
iseed	See reference
smin	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.212

hysest *Resampling algorithm for the computation of S-estimates*

Description

See Marazzi A. (1993), p.216

Usage

```
hysest(x, y, nq = np, iopt = .dFvGet()$ipt, intch = .dFvGet()$ich,
       nrep, tols = .dFvGet()$tls, tolr = .dFvGet()$tlr, tau = .dFvGet()$tua,
       gam = .dFvGet()$gma, maxit = .dFvGet()$mxt, maxs1 = .dFvGet()$msx,
       maxs2 = .dFvGet()$mxs, expsi = psi, expsp = psp, exchi = chi,
       iseed = .dFvGet()$isd)
```

Arguments

x	See reference
y	See reference
nq	See reference
iopt	See reference
intch	See reference
nrep	See reference
tols	See reference
tolr	See reference
tau	See reference
gam	See reference
maxit	See reference
maxs1	See reference
maxs2	See reference
expsi	See reference
expsp	See reference
exchi	See reference
iseed	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.216

hysestw *Resampling algorithm for the computation of weighted S-estimates*

Description

See Marazzi A. (1993), p.216

Usage

```
hysestw(x, y, wgt, nq = np, iopt = .dFvGet()$ipt, intch = .dFvGet()$ich,
        nrep, tols = .dFvGet()$tls, tolr = .dFvGet()$tlr, tau = .dFvGet()$tua,
        gam = .dFvGet()$gma, maxit = .dFvGet()$mxt, maxs1 = .dFvGet()$msx,
        maxs2 = .dFvGet()$mxs, expsi = psi, expsp = psp, exchi = chi,
        iseed = .dFvGet()$isd)
```

Arguments

x	See reference
y	See reference
wgt	See reference
nq	See reference
iopt	See reference
intch	See reference
nrep	See reference
tols	See reference
tolr	See reference
tau	See reference
gam	See reference
maxit	See reference
maxs1	See reference
maxs2	See reference
expsi	See reference
expsp	See reference
exchi	See reference
iseed	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.216

ingama *Incomplete Gamma-integral function*

Description

See Marazzi A. (1993), p.381

Usage

```
ingama(x, p)
```

Arguments

x	See reference
p	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.381

kfascv *Backtransformation of the covariance matrix of the coefficient estimates*

Description

See Marazzi A. (1993), p.152

Usage

```
kfascv(xt, cov, k = np, mdx = nrow(xt), f = .dFvGet()$fff, sg, ip)
```

Arguments

xt	See reference
cov	See reference
k	See reference
mdx	See reference
f	See reference
sg	See reference
ip	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.152

---

kfedcb *Diagonal hat matrices D_M, E_M, D_S, and E_S*

Description

See Marazzi A. (1993), p.159

Usage

```
kfedcb(wgt, rs, expsi = psi, expsp = psp, sigma, itype = .dFvGet()$ite)
```

Arguments

`wgt`	See reference
`rs`	See reference
`expsi`	See reference
`expsp`	See reference
`sigma`	See reference
`itype`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.15

kfedcc *Diagonal 'check' matrices D_M, E_M, D_S, and E_S*

Description

See Marazzi A. (1993), p.160

Usage

```
kfedcc(wgt, rs, expsi = psi, expsp = psp, sigma, itype = .dFvGet()$ite)
```

Arguments

wgt	See reference
rs	See reference
expsi	See reference
expsp	See reference
sigma	See reference
itype	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.160

kffacv *Correction factor f_H for the covariance matrix of a Huber-type estimate*

Description

See Marazzi A. (1993), p.154

Usage

```
kffacv(rs, expsi = psi, expsp = psp, np, sigma)
```

Arguments

`rs`	See reference
`expsi`	See reference
`expsp`	See reference
`np`	See reference
`sigma`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.154

`kiascv` *Covariance matrix of the coefficient estimates of the form f.inv(XT X) in the transformed coordinate system*

Description

See Marazzi A. (1993), p.150

Usage

```
kiascv(xt, k = np, mdx = nrow(xt), fu = .dFvGet()$fu1, fb = .dFvGet()$fb1)
```

Arguments

`xt`	See reference
`k`	See reference
`mdx`	See reference
`fu`	See reference
`fb`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.150

kiedch *Diagonal matrices D_M, E_M, D_S, E_S when psi is the Huber function*

Description

See Marazzi A. (1993), p.156

Usage

```
kiedch(wgt, c = .dFvGet()$ccc, itype = .dFvGet()$ite)
```

Arguments

wgt	See reference
c	See reference
itype	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.156

kiedcu *Diagonal matrices D_M, E_M, D_S, E_S when psi is a user-supplied function*

Description

See Marazzi A. (1993), p.157

Usage

```
kiedcu(wgt, expsi = psi, itype = .dFvGet()$ite, upper = .dFvGet()$upr,
       til = .dFvGet()$tli)
```

Arguments

wgt	See reference
expsi	See reference
itype	See reference
upper	See reference
til	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.157

`ktaskv` *Covariance matrix of the coefficient estimates of the form f.inv(XT X)*

Description

See Marazzi A. (1993), p.147

Usage

```
ktaskv(x, n = nrow(x), tau = .dFvGet()$tua, f = .dFvGet()$fff)
```

Arguments

`x`	See reference
`n`	See reference
`tau`	See reference
`f`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.147

ktaskw *Covariance matrix of the coefficient estimates of the form f.inv(S1) S2 inv(S1)*

Description

See Marazzi A. (1993), p.148

Usage

```
ktaskw(x, d, e, tau = .dFvGet()$tua, ia = .dFvGet()$ia1, f = .dFvGet()$fff,
       f1 = .dFvGet()$ff1, iainv = .dFvGet()$ia2, a)
```

Arguments

x	See reference
d	See reference
e	See reference
tau	See reference
ia	See reference
f	See reference
f1	See reference
iainv	See reference
a	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.148

`lgama` *Logarithm at the Gamma-function at the point x*

Description

See Marazzi A. (1993), p.383

Usage

```
lgama(x)
```

Arguments

`x`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.383

`libet0` *Computation of Beta0 = Phi_inv(0.75)*

Description

See Marazzi A. (1993), p.46

Usage

```
libet0()
```

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.46

libeth — *Computation of Int Chi(s) dPhi(s) when Chi=Psi.Psi/2 and Psi is the Huber function*

Description

See Marazzi A. (1993), p.44

Usage

```
libeth(d = .dFvGet()$ddd)
```

Arguments

`d`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.44

libetu — *Computation of Int Chi(s) dPhi(s) when Chi is a user-supplied function*

Description

See Marazzi A. (1993), p.45

Usage

```
libetu(exchi = chi, upper = .dFvGet()$upr, til = .dFvGet()$tli)
```

Arguments

`exchi`	See reference
`upper`	See reference
`til`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.45

`liclls` *Classical estimates of mean and standard deviation*

Description

See Marazzi A. (1993), p.27

Usage

```
liclls(y)
```

Arguments

`y`	Vector of observations

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.27

`liepsh` *Computation of Int Psi(s).Psi(s) dPhi(s) and Int Psi'(s) dPhi(s) when Psi is the Huber function*

Description

See Marazzi A. (1993), p.47

Usage

```
liepsh(c = .dFvGet()$ccc)
```

Arguments

`c`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.47

liepsu *Computation of Int Psi(s).Psi(s) dPhi(s) and Int Psi'(s) dPhi(s) when Psi is a user-supplied external function*

Description

See Marazzi A. (1993), p.48

Usage

```
liepsu(expsi = psi, upper = .dFvGet()$upr, til = .dFvGet()$tli)
```

Arguments

expsi	See reference
upper	See reference
til	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.48

liindh *Inverts the approximate null distribution of the one-sample Wilcoxon test statistic*

Description

See Marazzi A. (1993), p.36

Usage

```
liindh(alpha = .dFvGet()$alf, n)
```

Arguments

`alpha`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.36

`liinds` *Inverts the approximate null distribution of the sign test statistic*

Description

See Marazzi A. (1993), p.35

Usage

```
liinds(alpha = .dFvGet()$alf, n)
```

Arguments

`alpha`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.35

`liindw` *Inverts the approximate null distribution of the Mann-Whitney test statistic*

Description

See Marazzi A. (1993), p.43

Usage

```
liindw(alpha = .dFvGet()$alf, m, n)
```

Arguments

`alpha`	See reference
`m`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.43

`lilars` *Median an median absolute deviation*

Description

See Marazzi A. (1993), p.28

Usage

```
lilars(y, isort = .dFvGet()$isr)
```

Arguments

`y`	See reference
`isort`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.28

`littst` *t-test for the shift parameter*

Description

See Marazzi A. (1993), p.37

Usage

```
littst(x, y, alpha = .dFvGet()$alf)
```

Arguments

`x`	See reference
`y`	See reference
`alpha`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.37

`lmdd` *Median and median absolute deviation*

Description

See Marazzi A. (1993), p.388

Usage

```
lmdd(x, isort = 1)
```

Arguments

`x`	See reference
`isort`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.388

---

lrfctd *Computation of Li, li and lip*

Description

See Marazzi A. (1993), p.282-286 and p.297-298

Usage

```
lrfctd(icase, y, ci, vtheta, offset, wa, ni, i0, i1, i2)
```

Arguments

`icase`	Integer: 1 for Bernouilli, 2 for binomial and 3 for Poisson.
`y`	The y vector.
`ci`	The c_i vector.
`vtheta`	The x by theta vector.
`offset`	The offset vector.
`wa`	The a_i vector.
`ni`	The integer n_i vector.
`i0`	Integer: 1 to compute Li otherwise 0.
`i1`	Integer: 1 to compute li otherwise 0.
`i2`	Integer: 1 to compute lip otherwise 0.

Value

List with the following components :

`f0`	NULL if i0=0 else Li.
`i1`	NULL if i1=0 else li , derivative of Li.
`i2`	NULL if i2=0 else lip, derivative of li.
`sf0`	NULL if i0=0 else sum of the Li components.

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.282-286 and p.297-298 lyhalg *M-estimate of location with simultaneous estimation of scale*

Description

See Marazzi A. (1993), p.30

Usage

```
lyhalg(y, expsi = psi, expsp = psp, exchi = chi, theta, sigmai,
       tol = .dFvGet()$tlo, gam = .dFvGet()$gma, isigma = .dFvGet()$isg,
       maxit = .dFvGet()$mxt, maxis = .dFvGet()$mxs)
```

Arguments

y	See reference
expsi	See reference
expsp	See reference
exchi	See reference
theta	See reference
sigmai	See reference
tol	See reference
gam	See reference
isigma	See reference
maxit	See reference
maxis	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.30

lyhdle *Hodges-Lehman estimate and confidence intervals for the center of symmetry based on the one-sample Wilcoxon test*

Description

See Marazzi A. (1993), p.33

Usage

```
lyhdle(y, isort = .dFvGet()$isr, k, tol = .dFvGet()$tlo,
       maxit = .dFvGet()$mxt)
```

Arguments

y	See reference
isort	See reference
k	See reference
tol	See reference
maxit	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.33

lymnwt *Nonparametric estimate and confidence intervals for the shift parameter based on the Mann-Whitney test statistic*

Description

See Marazzi A. (1993), p.41

Usage

```
lymnwt(x, y, isort = .dFvGet()$isr, k, tol = .dFvGet()$tlo,
       maxit = .dFvGet()$mxt)
```

Arguments

`x`	See reference
`y`	See reference
`isort`	See reference
`k`	See reference
`tol`	See reference
`maxit`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.41

`lytau2` *tau-test for the shift parameter*

Description

See Marazzi A. (1993), p.38

Usage

```
lytau2(z, expsi = psi, expsp = psp, exchi = chi, exrho = rho, m, n,
       tol = .dFvGet()$tlo, gam = .dFvGet()$gma, isigma = .dFvGet()$isg,
       maxit = .dFvGet()$mxt, nitmon = .dFvGet()$ntm)
```

Arguments

`z`	See reference
`expsi`	See reference
`expsp`	See reference
`exchi`	See reference
`exrho`	See reference
`m`	See reference
`n`	See reference
`tol`	See reference
`gam`	See reference
`isigma`	See reference
`maxit`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.38

---

lywalg *W-algorithm for M-estimate of location*

Description

Robust location estimate with simultaneous estimation of the scale parameter

Usage

```
lywalg(y, lambda, psp0 = psp(0), expsi = psi, exchi = chi, exrho = rho,
       sigmai, tol = .dFvGet()$tlo, gam = .dFvGet()$gma,
       isigma = .dFvGet()$isg, maxit = .dFvGet()$mxt, maxis = .dFvGet()$mxs,
       nitmon = .dFvGet()$ntm)
```

Arguments

`y`	Vector containing the observations
`lambda`	Initial solution of the location parameter
`psp0`	Value of psp(0) (first derivative of the psi function)
`expsi`	User supplied psi function
`exchi`	User supplied chi function
`exrho`	User supplied rho function
`sigmai`	Initial estimate of the scale parameter
`tol`	Relative precision for the convergence criterion
`gam`	Relaxation factor. Set 0 < gam < 2.
`isigma`	If isigma<0, the value of sigma is not changed during the first iteration. If isigma=0, bypasss iteration on sigma (sigmaf=sigmai). If |isigma|>0, sigma is updated using the robeth function rysigm.
`maxit`	Maximum number of cycles
`maxis`	Maximum number of iterations for the scale step
`nitmon`	If nitmon>0 and the iteration counter is a multiple of nitmon, the current value of sigma, theta and delta are printed. If no iteration monitoring is required, set nitmon equal to 0.

Details

The .dFv variables for the default values must be created by a call to the `dfvals()` function of the robeth package. To see if this variable is available in your R session, type ls(all.names=TRUE). The parameters for psi, chi and rho functions must also be set by a preliminary call to the `dfcomn` function of the robeth package.

Value

`lambda`	Final value of the location estimate
`nit`	Reached number of cycles
`sigmaf`	Final estimate of sigma
`rs`	The residual vector

References

Marazzi A. (1993), *Algorithm, Routines, and S functions for Robust Statistics*, Wadsworth & Brooks/cole, Pacific Grove, California. p.30 and p.83 .

`mchl` *Cholesky decomposition of a symmetric matrix*

Description

See Marazzi A. (1993), p.353

Usage

```
mchl(a, n)
```

Arguments

`a`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.353

mchld *Cholesky decomposition of a symmetric matrix (double precision)*

Description

See Marazzi A. (1993), p.353

Usage

```
mchld(a, n)
```

Arguments

`a`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.353

messagena *Print a message when a required argument is missing*

Description

Function only needed for the interface

Usage

```
messagena(x)
```

Arguments

`x`	A character string

Value

None (invisible NULL).

mff *Multiplies a full matrix by a full matrix*

Description

See Marazzi A. (1993), p.339

Usage

```
mff(a, b, m = nrow(a))
```

Arguments

a	See reference
b	See reference
m	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.339

mffd *Multiplies a full matrix by a full matrix (double precision)*

Description

See Marazzi A. (1993), p.339

Usage

```
mffd(a, b, m = nrow(a))
```

Arguments

a	See reference
b	See reference
m	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.339

`mfragr` *Generation and comparison of all regressions on subsets of covariates*

Description

See Marazzi A. (1993), p.258

Usage

```
mfragr(x, y, vp, nc, itype = .dFvGet()$ith, c = .dFvGet()$ccc,
       tol = .dFvGet()$tlo, gam = .dFvGet()$gma,
       maxit = .dFvGet()$mxt, sigmac, sigmar)
```

Arguments

`x`	See reference
`y`	See reference
`vp`	See reference
`nc`	See reference
`itype`	See reference
`c`	See reference
`tol`	See reference
`gam`	See reference
`maxit`	See reference
`sigmac`	See reference
`sigmar`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.258

mfy *Multiplies a full matrix by a vector*

Description

See Marazzi A. (1993), p.342

Usage

```
mfy(a, y, m = nrow(a), iye = 1, ize = 1)
```

Arguments

a	See reference
y	See reference
m	See reference
iye	See reference
ize	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.342

mfyd *Multiplies a full matrix by a vector (double precision)*

Description

See Marazzi A. (1993), p.342

Usage

```
mfyd(a, y, m = nrow(a), iye = 1, ize = 1)
```

Arguments

a	See reference
y	See reference
m	See reference
iye	See reference
ize	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.342

---

mhat *Computes the diagonal elements of the hat matrix*

Description

See Marazzi A. (1993), p.354

Usage

```
mhat(x, n = nrow(x), k = np, sh)
```

Arguments

`x`	See reference
`n`	See reference
`k`	See reference
`sh`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.354

minv *Inverts a triangular matrix*

Description

See Marazzi A. (1993), p.348

Usage

```
minv(r, n, tau = .dFvGet()$tua)
```

Arguments

r	See reference
n	See reference
tau	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.348

minvd *Inverts a triangular matrix (double precision)*

Description

See Marazzi A. (1993), p.348

Usage

```
minvd(r, n, tau = .dFvGet()$tua)
```

Arguments

r	See reference
n	See reference
tau	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.348

mirtsr *Computation of (robust) t-statistics for t-directed search*

Description

See Marazzi A. (1993), p.262

Usage

```
mirtsr(x, y, itype = .dFvGet()$ite, c = .dFvGet()$ccc,
       d = .dFvGet()$ddd, tol = .dFvGet()$tlo,
       gam = .dFvGet()$gma,  maxit = .dFvGet()$mxt,
       maxis = .dFvGet()$mxs, tau = .dFvGet()$tua)
```

Arguments

`x`	See reference
`y`	See reference
`itype`	See reference
`c`	See reference
`d`	See reference
`tol`	See reference
`gam`	See reference
`maxit`	See reference
`maxis`	See reference
`tau`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.262

mly *Multiplies a lower-triangular matrix by a vector*

Description

See Marazzi A. (1993), p.346

Usage

```
mly(a, y, n, iye = 1)
```

Arguments

a	See reference
y	See reference
n	See reference
iye	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.346

mlyd *Multiplies a lower-triangular matrix by a vector (double precision)*

Description

See Marazzi A. (1993), p.346

Usage

```
mlyd(a, y, n, iye = 1)
```

Arguments

a	See reference
y	See reference
n	See reference
iye	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.346

msf *Multiplies a symmetric matrix by a full matrix*

Description

See Marazzi A. (1993), p.340

Usage

```
msf(a, b, n)
```

Arguments

a	See reference
b	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.340

`msf1` *Multiplies a symmetric matrix by a full matrix when the result is a symmetric matrix*

Description

See Marazzi A. (1993), p.341

Usage

```
msf1(a, b)
```

Arguments

`a`	See reference
`b`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.341

`msf1d` *Multiplies a symmetric matrix by a full matrix when the result is a symmetric matrix*

Description

See Marazzi A. (1993), p.341

Usage

```
msf1d(a, b)
```

Arguments

`a`	See reference
`b`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.341

---

msfd *Multiplies a symmetric matrix by a full matrix (double precision)*

Description

See Marazzi A. (1993), p.340

Usage

```
msfd(a, b, n)
```

Arguments

a	See reference
b	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California.v

---

mss *Multiplies a symmetric matrix by a symmetric matrix*

Description

See Marazzi A. (1993), p.338

Usage

```
mss(a, b, n)
```

Arguments

a	See reference
b	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.338

`mssd` *Multiplies a symmetric matrix by a symmetric matrix (double precision)*

Description

See Marazzi A. (1993), p.342

Usage

```
mssd(a, b, n)
```

Arguments

`a`	See reference
`b`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.342

mtt1 *Multiplies an upper-triangular matrix by its transpose*

Description

See Marazzi A. (1993), p.343

Usage

```
mtt1(a, n)
```

Arguments

a	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.343

mtt1d *Multiplies an upper-triangular matrix by its transpose (double precision)*

Description

See Marazzi A. (1993), p.343

Usage

```
mtt1d(a, n)
```

Arguments

a	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.343

---

mtt2 *Multiplies a lower-triangular matrix by its transpose*

Description

See Marazzi A. (1993), p.344

Usage

```
mtt2(a, n)
```

Arguments

a	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.344

---

mtt2d *Multiplies a lower-triangular matrix by its transpose (double precision)*

Description

See Marazzi A. (1993), p.344

Usage

```
mtt2d(a, n)
```

Arguments

a	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.344

---

mtt3 *Multiplies a triangular matrix by a triangular matrix*

Description

See Marazzi A. (1993), p.345

Usage

```
mtt3(a, b, n)
```

Arguments

`a`	See reference
`b`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.345

mtt3d *Multiplies a triangular matrix by a triangular matrix (double precision)*

Description

See Marazzi A. (1993), p.345

Usage

```
mtt3d(a, b, n)
```

Arguments

a	See reference
b	See reference
n	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.345

mty *Multiplies an upper-triangular matrix by a vector*

Description

See Marazzi A. (1993), p.347

Usage

```
mty(a, y, n, iye = 1)
```

Arguments

a	See reference
y	See reference
n	See reference
iye	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.347

`mtyd` *Multiplies an upper-triangular matrix by a vector*

Description

See Marazzi A. (1993), p.347

Usage

```
mtyd(a, y, n, iye = 1)
```

Arguments

`a`	See reference
`y`	See reference
`n`	See reference
`iye`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.347

myhbhe *High breakdown point and high efficiency regression with test for bias*

Description

See Marazzi A. (1993), p.270

Usage

```
myhbhe(x, y, iseed = .dFvGet()$isd)
```

Arguments

x	See reference
y	See reference
iseed	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.270

mymvlm *Simultaneous computation of the MVE and LMS estimates*

Description

See Marazzi A. (1993), p.265

Usage

```
mymvlm(x, y, ilms = .dFvGet()$ilm, iopt = .dFvGet()$ipt,
       intch = .dFvGet()$ich, nrep, tolv = .dFvGet()$tlv,
       tolm = .dFvGet()$tlm, tau = .dFvGet()$tua,
       iseed = .dFvGet()$isd)
```

Arguments

`x`	See reference
`y`	See reference
`ilms`	See reference
`iopt`	See reference
`intch`	See reference
`nrep`	See reference
`tolv`	See reference
`tolm`	See reference
`tau`	See reference
`iseed`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.265

`nlgm` *Logarithm of the Gamma-function at the point n/2*

Description

See Marazzi A. (1993), p.382

Usage

```
nlgm(n)
```

Arguments

`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.382

nrm2 *Forms the Euclidean norm of a vector*

Description

See Marazzi A. (1993), p.351

Usage

```
nrm2(x, n = nrow(x), incx = 1)
```

Arguments

x	See reference
n	See reference
incx	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.351

nrm2d *Forms the Euclidean norm of a vector (double precision)*

Description

See Marazzi A. (1993), p.351

Usage

```
nrm2d(x, n = nrow(x), incx = 1)
```

Arguments

x	See reference
n	See reference
incx	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.351

---

permc *Permutes the columns of a matrix by means of transpositions*

Description

See Marazzi A. (1993), p.365

Usage

```
permc(x, it, n = nrow(x), iopt = 1)
```

Arguments

x	See reference
it	See reference
n	See reference
iopt	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.365

---

permv *Permutes the elements of a vector*

Description

See Marazzi A. (1993), p.366

Usage

```
permv(y, it, iopt = 1)
```

Arguments

`y`	See reference
`it`	See reference
`iopt`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.366

`poissn` *Poisson distribution*

Description

See Marazzi A. (1993), p.368

Usage

```
poissn(lambda, k)
```

Arguments

`lambda`	See reference
`k`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.368

`precd` *Algorithmic determination of the smallest double precision positive number x*

Description

See Marazzi A. (1993), p.385

Usage

```
precd()
```

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.385

`precs` *Algorithmic determination of the smallest double precision positive number x*

Description

See Marazzi A. (1993), p.385

Usage

```
precs()
```

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.385

`probst` *Cumulative t-distribution function*

Description

See Marazzi A. (1993), p.377

Usage

```
probst(x, ifn)
```

Arguments

`x`	See reference
`ifn`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.377

`Psi` *psi weight function for location and regression*

Description

See Marazzi A. (1993), p.319

Usage

```
Psi(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the psi weight function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.319

`psi` *psi weight function for location and regression*

Description

See Marazzi A. (1993), p.319

Usage

```
psi(s)
```

Arguments

`s`	A scalar input value

Value

The value of the psi weight function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.319

`Psp` *psi' weight function for location and regression*

Description

See Marazzi A. (1993), p.320

Usage

```
Psp(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the psi' weight function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.320

psp *psi' weight function for location and regression*

Description

See Marazzi A. (1993), p.320

Usage

```
psp(s)
```

Arguments

s	A scalar input value

Value

The value of the psi' weight function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.320

QD2coef.f *Auxiliary function to find mu and sigma parameter for extended loggamma distribution*

Description

QD2coef.f computes for a given lambda, the mu and sigma parameters

Usage

```
QD2coef.f(lambda, yc, delta, muI, sigmaI, zero=1e-4)
```

Arguments

lambda	See reference
yc	See reference
delta	See reference
muI	See reference
sigmaI	See reference
zero	See reference

Value

See reference

References

Marazzi A. (2010) Robust estimation of the extended log-gamma (not yet published)

`QD2funC.f` *Auxiliary function to find lambda parameter for extended loggamma distribution*

Description

QD2funC.f computes a sum of squared residuals for a given lambda

Usage

```
QD2funC.f(lambda, yc, delta, muI, sigmaI, zero=1e-4)
```

Arguments

`lambda`	See reference
`yc`	See reference
`delta`	See reference
`muI`	See reference
`sigmaI`	See reference
`zero`	See reference

Value

See reference

References

Marazzi A. (2010) Robust estimation of the extended log-gamma (not yet published)

Qn.Exp.f *Auxiliary function to compute quantiles of survival cdf*

Description

Qn.Exp.f computes quantiles of survival cdf

Usage

```
 Qn.Exp.f(p, yc, delta, mu, sigma, lambda, zero=1e-4)
```

Arguments

`p`	See reference
`yc`	See reference
`delta`	See reference
`mu`	See reference
`sigma`	See reference
`lambda`	See reference
`zero`	See reference

Value

See reference

References

Marazzi A. (2010) Robust estimation of the extended log-gamma (not yet published)

quant *Inverse of the standard Gaussian cumulative distribution function*

Description

See Marazzi A. (1993), p.372

Usage

```
quant(p)
```

Arguments

`p`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.372

`Random` *Uniform random number generator*

Description

See Marazzi A. (1993), p.386

Usage

```
Random(iseed = .dFvGet()$isd)
```

Arguments

`iseed`	See reference

Details

See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California.p.386

Regtau.f *Auxiliary function for the computation of QQopt*

Description

QQopt is a resampling algorithm for the determination of the parameters of a Loggamma model

Usage

```
Regtau.f(x, y, b1, c1, b2, c2, N, tol = 1e-6, seed = 567)
```

Arguments

`x`	See reference
`y`	See reference
`b1`	See reference
`c1`	See reference
`b2`	See reference
`c2`	See reference
`N`	See reference
`tol`	See reference
`seed`	See reference

Value

See reference

References

Marazzi A. (2009) Robust estimation of the generalized log-gamma (not yet published)

RegtauW.f *Auxiliary function for the computation of QQopt*

Description

QQopt is a resampling algorithm for the determination of the parameters of a Loggamma model

Usage

```
RegtauW.f(x, y, w, b1, c1, b2, c2, N, tol = 1e-6, seed = 567)
```

Arguments

`x`	See reference
`y`	See reference
`w`	See reference
`b1`	See reference
`c1`	See reference
`b2`	See reference
`c2`	See reference
`N`	See reference
`tol`	See reference
`seed`	See reference

Value

See reference

References

Marazzi A. (2009) Robust estimation of the generalized log-gamma (not yet published)

Rho — *Rho weight function for location and regression*

Description

See Marazzi A. (1993), p.320

Usage

```
Rho(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the rho function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.320

`rho` *rho weight function for location and regression*

Description

See Marazzi A. (1993), p.320

Usage

```
rho(s)
```

Arguments

`s`	A scalar input value

Value

The value of the rho function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.320

`ribet0` *Computation of the constant Beta0*

Description

See Marazzi A. (1993), p.100

Usage

```
ribet0(wgt, itype = .dFvGet()$ite, isqw = .dFvGet()$isq,
       tol = .dFvGet()$tlo)
```

Arguments

`wgt`	See reference
`itype`	See reference
`isqw`	See reference
`tol`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.10

ribeth *Computation of the constant Beta when Chi=Psi.Psi/2 and Psi is the Huber function*

Description

See Marazzi A. (1993), p.97

Usage

```
ribeth(wgt, d = .dFvGet()$ddd, itype = .dFvGet()$ite)
```

Arguments

wgt	See reference
d	See reference
itype	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.97

ribetu *Computation of the constant Beta when Chi is a user-supplied function*

Description

See Marazzi A. (1993), p.98

Usage

```
ribetu(wgt, exchi = chi, itype = .dFvGet()$ite, upper = .dFvGet()$upr,
       til = .dFvGet()$tli)
```

Arguments

`wgt`	See reference
`exchi`	See reference
`itype`	See reference
`upper`	See reference
`til`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.98

`riclls` *Solution of the least squares problem*

Description

See Marazzi A. (1993), p.67

Usage

```
riclls(xt, y, k = np, ix = .dFvGet()$ix1, iy = .dFvGet()$iy1,
       sf, sg, sh, ip)
```

Arguments

`xt`	See reference
`y`	See reference
`k`	See reference
`ix`	See reference
`iy`	See reference
`sf`	See reference
`sg`	See reference
`sh`	See reference
`ip`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.67

---

rilars *Solution of the least absolute residual problem*

Description

See Marazzi A. (1993), p.71

Usage

```
rilars(x, y, tol = .dFvGet()$tlu)
```

Arguments

x	See reference
y	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.71

---

rimtrd *Double precision version of RIMTRF*

Description

See Marazzi A. (1993), p.64

Usage

```
rimtrd(x, n = nrow(x), intch = .dFvGet()$ith, tau = .dFvGet()$tua)
```

Arguments

`x`	See reference
`n`	See reference
`intch`	See reference
`tau`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.64

See Also

`rimtrf`

`rimtrf` *Upper triangularization (QR-decomposition) of the design matrix and determination of its pseudorank*

Description

See Marazzi A. (1993), p.64

Usage

```
rimtrf(x, n = nrow(x), intch = .dFvGet()$ith, tau = .dFvGet()$tua)
```

Arguments

`x`	See reference
`n`	See reference
`intch`	See reference
`tau`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.64

rmvc — *Removes a column from a transformed design matrix and updates its QR-decomposition*

Description

See Marazzi A. (1993), p.357

Usage

```
rmvc(x, n = nrow(x), l, j, ip)
```

Arguments

x	See reference
n	See reference
l	See reference
j	See reference
ip	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.357

ruben — *Cumulative distribution and density function of a linear combination of chi-2 random variables*

Description

See Marazzi A. (1993), p.375

Usage

```
ruben(xlmbda, delta, mult, x, xmode = 1, maxit = 50, eps = 1e-04)
```

Arguments

`xlmbda`	See reference
`delta`	See reference
`mult`	See reference
`x`	See reference
`xmode`	See reference
`maxit`	See reference
`eps`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.375

`rybifr` *Bounded influence regression*

Description

See Marazzi A. (1993), p.410

Usage

```
rybifr(x, y, np, nthet = np + 1, itype = 2, icoll = 0, isigma = 1,
       ch = 1.345, ck = 1.05 * sqrt(nthet), bm = 1.05 * sqrt(nthet),
       tol = 0.001, tau = 1e-06, maxitt = 50, maxitw = 80)
```

Arguments

`x`	See reference
`y`	See reference
`np`	See reference
`nthet`	See reference
`itype`	See reference
`icoll`	See reference
`isigma`	See reference
`ch`	See reference
`ck`	See reference

bm	See reference
tol	See reference
tau	See reference
maxitt	See reference
maxitw	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.410

ryhalg *H-algorithm for M-estimates*

Description

See Marazzi A. (1993), p.98

Usage

```
ryhalg(x, y, theta, wgt, cov, expsi = psi, exchi = chi, exrho = rho,
       sigmai, k = np, tol = .dFvGet()$tlo, gam = .dFvGet()$gma,
       tau = .dFvGet()$tua, itype = .dFvGet()$ite, ix = .dFvGet()$ix1,
       iy = .dFvGet()$iy1, ic = .dFvGet()$ic1, isigma = .dFvGet()$isg,
       icnv = .dFvGet()$icn, maxit = .dFvGet()$mxt, maxis = .dFvGet()$mxs,
       nitmon = .dFvGet()$ntm, sf, sg, sh, ip)
```

Arguments

x	See reference
y	See reference
theta	See reference
wgt	See reference
cov	See reference
expsi	See reference
exchi	See reference
exrho	See reference
sigmai	See reference
k	See reference

`tol`	See reference
`gam`	See reference
`tau`	See reference
`itype`	See reference
`ix`	See reference
`iy`	See reference
`ic`	See reference
`isigma`	See reference
`icnv`	See reference
`maxit`	See reference
`maxis`	See reference
`nitmon`	See reference
`sf`	See reference
`sg`	See reference
`sh`	See reference
`ip`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.98

`rynalg` *Newton algorithm with adaptive steps for M-estimates*

Description

See Marazzi A. (1993), p.73

Usage

```
rynalg(x, y, theta, wgt, cov, expsi = psi, expsp = psp, exchi = chi,
       exrho = rho, sigmai, gam = .dFvGet()$gma, tol = .dFvGet()$tlo,
       tau = .dFvGet()$tua, itype = .dFvGet()$ite, iopt = .dFvGet()$iop,
       isigma = .dFvGet()$isg, icnv = .dFvGet()$icn, maxit = .dFvGet()$mxt,
       maxis = .dFvGet()$mxs, nitmon = .dFvGet()$ntm)
```

Arguments

`x`	See reference
`y`	See reference
`theta`	See reference
`wgt`	See reference
`cov`	See reference
`expsi`	See reference
`expsp`	See reference
`exchi`	See reference
`exrho`	See reference
`sigmai`	See reference
`gam`	See reference
`tol`	See reference
`tau`	See reference
`itype`	See reference
`iopt`	See reference
`isigma`	See reference
`icnv`	See reference
`maxit`	See reference
`maxis`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.73

`rysalg` *S-algorithm for M-estimates*

Description

See Marazzi A. (1993), p.87

Usage

```
rysalg(x, y, theta, wgt, cov, sigmai, tol = .dFvGet()$tlo,
       tau = .dFvGet()$tua, itype = .dFvGet()$ite,
       isigma = .dFvGet()$isg, icnv = .dFvGet()$icn,
       maxit = .dFvGet()$mxt, maxis = .dFvGet()$mxs,
       nitmon = .dFvGet()$ntm)
```

Arguments

`x`	See reference
`y`	See reference
`theta`	See reference
`wgt`	See reference
`cov`	See reference
`sigmai`	See reference
`tol`	See reference
`tau`	See reference
`itype`	See reference
`isigma`	See reference
`icnv`	See reference
`maxit`	See reference
`maxis`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.87

`rysigm` *Iterative algorithm for the computation of an M-estimate of the scale parameter when the residuals are given*

Description

See Marazzi A. (1993), p.94

Usage

```
rysigm(rs, wgt, exchi = chi, sigmai, np, tol = .dFvGet()$tlo,
       itype = .dFvGet()$ite, isigma = .dFvGet()$isg,
       maxis = .dFvGet()$mxt)
```

Arguments

rs	See reference
wgt	See reference
exchi	See reference
sigmai	See reference
np	See reference
tol	See reference
itype	See reference
isigma	See reference
maxis	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.94

---

rywalg *W-algorithm for M-estimates*

Description

See Marazzi A. (1993), p.87

Usage

```
rywalg(x, y, theta, wgt, cov, psp0 = psp(0), expsi = psi, exchi = chi,
       exrho = rho, sigmai, tol = .dFvGet()$tlo, gam = .dFvGet()$gma,
       tau = .dFvGet()$tua, itype = .dFvGet()$ite, isigma = .dFvGet()$isg,
       icnv = .dFvGet()$icn, maxit = .dFvGet()$mxt, maxis = .dFvGet()$mxs,
       nitmon = .dFvGet()$ntm)
```

Arguments

`x`	See reference
`y`	See reference
`theta`	See reference
`wgt`	See reference
`cov`	See reference
`psp0`	See reference
`expsi`	See reference
`exchi`	See reference
`exrho`	See reference
`sigmai`	See reference
`tol`	See reference
`gam`	See reference
`tau`	See reference
`itype`	See reference
`isigma`	See reference
`icnv`	See reference
`maxit`	See reference
`maxis`	See reference
`nitmon`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.87

`scal` *Scales a vector by a constant*

Description

See Marazzi A. (1993), p.349

Usage

```
scal(x, sa, n = nrow(x), incx = 1)
```

Arguments

x	See reference
sa	See reference
n	See reference
incx	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.349

scald *Scales a double precision vector by a constant*

Description

See Marazzi A. (1993), p.349

Usage

```
scald(x, sa, n = nrow(x), incx = 1)
```

Arguments

x	See reference
sa	See reference
n	See reference
incx	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.349

See Also

scal

srt1 *Sorts the components of a vector in ascending order*

Description

See Marazzi A. (1993), p.361

Usage

```
srt1(a, k1 = 1, k2 = n)
```

Arguments

a	See reference
k1	See reference
k2	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.361

See Also

srt2

srt2 *Sorts the components of a vector in ascending order and permutes the components of another vector accordingly*

Description

See Marazzi A. (1993), p.362

Usage

```
srt2(a, b, k1 = 1, k2 = n)
```

Arguments

a	See reference
b	See reference
k1	See reference
k2	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.362

See Also

srt1

swap *Interchanges two vectors*

Description

See Marazzi A. (1993), p.363

Usage

```
swap(x, y, n = nrow(x), incx = 1, incy = 1)
```

Arguments

x	See reference
y	See reference
n	See reference
incx	See reference
incy	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.363

See Also

swapd

swapd *Interchanges two vectors (double precision)*

Description

See Marazzi A. (1993), p.363

Usage

```
swapd(x, y, n = nrow(x), incx = 1, incy = 1)
```

Arguments

x	See reference
y	See reference
n	See reference
incx	See reference
incy	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.363

See Also

swap

tauare *Asymptotic relative efficiency of the tau-test*

Description

See Marazzi A. (1993), p.190

Usage

```
tauare(itype = .dFvGet()$ite, mu, maxit = .dFvGet()$mxe, cpsi, bb,
       sigmax = 1, upper = .dFvGet()$upr, til = .dFvGet()$tli,
       tol = .dFvGet()$tlo)
```

Arguments

itype	See reference
mu	See reference
maxit	See reference
cpsi	See reference
bb	See reference
sigmax	See reference
upper	See reference
til	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.190

tfrn2t *Computes the Rn2-test statistic for a linear hypothesis in canonical form*

Description

See Marazzi A. (1993), p.187

Usage

```
tfrn2t(cov, theta, n, nq, tau = .dFvGet()$tua)
```

Arguments

cov	See reference
theta	See reference
n	See reference
nq	See reference
tau	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.187

tftaut *Computes the tau-test statistic for a linear hypothesis in canonical form*

Description

See Marazzi A. (1993), p.182

Usage

```
tftaut(rs1, rs2, wgt, exrho = rho, np, nq, sigma, itype = .dFvGet()$ite)
```

Arguments

`rs1`	See reference
`rs2`	See reference
`wgt`	See reference
`exrho`	See reference
`np`	See reference
`nq`	See reference
`sigma`	See reference
`itype`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.182

`tisrtc` *Permutes the columns of the design matrix: Predictors in omega are placed in the first q positions*

Description

See Marazzi A. (1993), p.188

Usage

```
tisrtc(x, iv, n = nrow(x))
```

Arguments

`x`	See reference
`iv`	See reference
`n`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.188

`to.character` *Convert local variable to Fortran character*

Description

Function only needed for the interface

Usage

```
to.character(x)
```

Arguments

`x`	An R object

Value

x converted to character

`to.double` *Convert local variable to Fortran double precision*

Description

Function only needed for the interface

Usage

```
to.double(x)
```

Arguments

`x`	An R numeric object

Value

x converted to double precision

`to.integer` *Convert local variable to Fortran integer*

Description

Function only needed for the interface

Usage

```
to.integer(x)
```

Arguments

`x`	An R numeric object

Value

x converted to integer

`to.single` *Convert local variable to Fortran single precision*

Description

Function only needed for the interface

Usage

```
to.single(x)
```

Arguments

`x`	An R numeric object

Value

x converted to single precision

`tquant` *Inverse of the cumulative t-distribution function*

Description

See Marazzi A. (1993), p.378

Usage

```
tquant(p, ifn)
```

Arguments

`p`	See reference
`ifn`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.378

`ttaskt` *Computes the matrix Ktau*

Description

See Marazzi A. (1993), p.184

Usage

```
ttaskt(cov, ainv, np, nq, mdc = np - nq, fact = .dFvGet()$ffc)
```

Arguments

`cov`	See reference
`ainv`	See reference
`np`	See reference
`nq`	See reference
`mdc`	See reference
`fact`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.184

tteign *Computes the eigenvalues of the matrix Ktau*

Description

See Marazzi A. (1993), p.186

Usage

```
tteign(covtau, nq, mdc = np - nq)
```

Arguments

covtau	See reference
nq	See reference
mdc	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.186

Ucv *u weight function for covariances*

Description

See Marazzi A. (1993), p.323

Usage

```
Ucv(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the u function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.323

ucv *u weight function for covariances*

Description

See Marazzi A. (1993), p.323

Usage

```
ucv(s)
```

Arguments

`s`	A scalar input value

Value

The value of the u function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.323

`ugl` *ub weight function for M-estimates in GLM*

Description

See Marazzi A. (1993), p.331

Usage

```
ugl(upar, npar = 4, s)
```

Arguments

`upar`	See reference
`npar`	See reference
`s`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.331

`Upcv` *u' weight function for covariances*

Description

See Marazzi A. (1993), p.325

Usage

```
Upcv(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the u function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.325

---

upcv *u' weight function for covariances*

Description

See Marazzi A. (1993), p.325

Usage

```
upcv(s)
```

Arguments

s	A scalar input value

Value

The value of the u' function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.325

---

userfd *Dummy u user function (double precision)*

Description

See Marazzi A. (1993), p.139

Usage

```
userfd(s)
```

Arguments

s	A scalar input value

Value

The double precision value of the u function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.139

userfs *Dummy u user function*

Description

See Marazzi A. (1993), p.139

Usage

```
userfs(s)
```

Arguments

s A scalar input value

Value

The single precision value of the u function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.139

vcv *v weight function for covariances*

Description

See Marazzi A. (1993) p.327

Usage

```
vcv(s)
```

Arguments

s A scalar input value

Value

The value of the v function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.327

---

vpcv *v' weight function for covariances*

Description

See Marazzi A. (1993), p.327

Usage

```
vpcv(s)
```

Arguments

`s`	A scalar input value

Value

The value of the v' function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.327

Wcv *w weight function for covariances*

Description

See Marazzi A. (1993), p.328

Usage

```
Wcv(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the w function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.328

wcv *v weight function for covariances*

Description

See Marazzi A. (1993), p.328

Usage

```
wcv(s)
```

Arguments

s	A scalar input value

Value

The value of the w function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.328

wfshat *Schweppe original weight proposal*

Description

See Marazzi A. (1993), p.137

Usage

```
wfshat(xt, n = nrow(xt), sh)
```

Arguments

xt	See reference
n	See reference
sh	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.137

---

wimedv *Initial value of the matrix A*

Description

See Marazzi A. (1993), p.119

Usage

```
wimedv(x, nobs = nrow(x), itypw = .dFvGet()$itw,
       init = .dFvGet()$ini, nfirst = nobs)
```

Arguments

`x`	See reference
`nobs`	See reference
`itypw`	See reference
`init`	See reference
`nfirst`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.119

`Wpcv` *w' weight function for covariances*

Description

See Marazzi A. (1993), p.329

Usage

```
Wpcv(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the w' function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.329

`wpcv` *w' weight function for covariances*

Description

See Marazzi A. (1993), p.329

Usage

```
wpcv(s)
```

Arguments

`s`	A scalar input value

Value

The value of the w' function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.329

`Www` *w weight function for covariances*

Description

See Marazzi A. (1993), p.330

Usage

```
Www(svals)
```

Arguments

`svals`	A vector of input values

Value

The values of the w weight function for each element of svals

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.330

`www` *w weight function*

Description

See Marazzi A. (1993), p.330

Usage

```
www(s)
```

Arguments

`s`	A scalar input value

Value

The value of the w weight function for s

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.330

wyfalg *Fixed-point algorithm for the computation of the matrix A*

Description

See Marazzi A. (1993), p.121

Usage

```
wyfalg(x, a, gwt, exu = ucv, nobs = nrow(x), nvarq = 0,
       tau = .dFvGet()$tua, maxit = .dFvGet()$mxf, nitmon = .dFvGet()$ntm,
       icnv = .dFvGet()$icv, itypw = .dFvGet()$itw, igwt = 0,
       tol = .dFvGet()$tlo)
```

Arguments

x	See reference
a	See reference
gwt	See reference
exu	See reference
nobs	See reference
nvarq	See reference
tau	See reference
maxit	See reference
nitmon	See reference
icnv	See reference
itypw	See reference
igwt	See reference
tol	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.121

wyfcol *Modified fixed-point algorithm for collinear data in the standardized case*

Description

See Marazzi A. (1993), p.87

Usage

```
wyfcol(x, exu = ucv, nobs = nrow(x), iwgt = .dFvGet()$iwg,
       apar = .dFvGet()$apr, tau = .dFvGet()$tua,
       tol = .dFvGet()$tlo, maxit = .dFvGet()$mxf,
       nitmon = .dFvGet()$ntm, icnv = .dFvGet()$icv)
```

Arguments

`x`	See reference
`exu`	See reference
`nobs`	See reference
`iwgt`	See reference
`apar`	See reference
`tau`	See reference
`tol`	See reference
`maxit`	See reference
`nitmon`	See reference
`icnv`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.8

wygalg *Conjugate gradient algorithm for the computation of the lower-triangular matrix A in the standardized case*

Description

See Marazzi A. (1993), p.127

Usage

```
wygalg(x, a, exu = ucv, exup = upcv, nobs = nrow(x),
       maxit = .dFvGet()$mxg, nitmon = .dFvGet()$ntm,
       icnv = .dFvGet()$icv, tol = .dFvGet()$tlo,
       xfud = .dFvGet()$xfd)
```

Arguments

x	See reference
a	See reference
exu	See reference
exup	See reference
nobs	See reference
maxit	See reference
nitmon	See reference
icnv	See reference
tol	See reference
xfud	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.127

wynalg	*Newton-Huber algorithm for the computation of the lower-triangular matrix A in the standardized case*

Description

See Marazzi A. (1993), p.87

Usage

```
wynalg(x, a, exu = ucv, exup = upcv, nobs = nrow(x),
       maxit = .dFvGet()$mxn, nitmon = .dFvGet()$ntm,
       icnv = .dFvGet()$icv, tol = .dFvGet()$tlo,
       xfud = .dFvGet()$xfd)
```

Arguments

x	See reference
a	See reference
exu	See reference
exup	See reference
nobs	See reference
maxit	See reference
nitmon	See reference
icnv	See reference
tol	See reference
xfud	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.87

`xerf` *Gaussian density function*

Description

See Marazzi A. (1993), p.369

Usage

```
xerf(kode = 2, x)
```

Arguments

`kode`	See reference
`x`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.369

`xerp` *Density of the norm of a standard Gaussian vector with p components*

Description

See Marazzi A. (1993), p.370

Usage

```
xerp(ip, xlcnst = -1, s)
```

Arguments

`ip`	See reference
`xlcnst`	See reference
`s`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.370

`xsy` *Evaluates a quadratic form*

Description

See Marazzi A. (1993), p.352

Usage

```
xsy(x, y, s)
```

Arguments

`x`	See reference
`y`	See reference
`s`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.352

`xsyd` *Evaluates a quadratic form (double precision)*

Description

See Marazzi A. (1993) p.352

Usage

```
xsyd(x, y, s)
```

Arguments

`x`	See reference
`y`	See reference
`s`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.352

See Also

`xsy`

`zemll` *Zeng method for censored data*

Description

See Reference

Usage

```
zemll(b, x, yo, do)
```

Arguments

`b`	See reference
`x`	See reference
`yo`	See reference
`do`	See reference

Value

See reference

References

Marazzi A. (1993) *Algorithm, Routines, and S functions for Robust Statistics*. Wadsworth & Brooks/cole, Pacific Grove, California. p.216

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