Package ‘SMR’

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Title Externally Studentized Midrange Distribution
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Description Computes the studentized midrange distribution (pdf, cdf and quantile) and generates random numbers
License GPL (>= 2)
URL www.dex.ufla.br/~danielff/r_resources.html
NeedsCompilation no
Repository CRAN
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SMR

The externally studentized normal midrange distribution

Description

Computes the probability density, the cumulative distribution function and the quantile function and generates random samples for the externally studentized normal midrange distribution with the numbers means equal to size, the degrees of freedom equal to df and the number of points of the Gauss-Legendre quadrature equal to np.
Usage

dSMR(x, size, df, np=32, log = FALSE)
pSMR(q, size, df, np=32, lower.tail = TRUE, log.p = FALSE)
qSMR(p, size, df, np=32, eps = 1e-13, maxit = 5000, lower.tail = TRUE, log.p = FALSE)
rSMR(n, size, df = Inf)

Arguments

x, q  vector of quantiles $x \in R$ and $q \in R$.
p  vector of probabilities $(0, 1)$.
size  sample size. Only for $size > 1$.
n  vector size to be simulated $n > 1$.
df  degrees of freedom $df > 0$.
np  number of points of the gaussian quadrature $np > 2$.
log, log.p  logical argument; if TRUE, the probabilities $p$ are given as $log(p)$.
lower.tail  logical argument; if TRUE, the probabilities are $P[X \leq x]$ otherwise, $P[X \geq x]$.
eps  stopping criterion for Newton-Raphson’s iteration method.
maxit  maximum number of interaction in the Newton-Raphson method.

Details

Assumes np = 32 as default value for dSMR, pSMR and qSMR. If df is not specified, it assumes the default value $Inf$ in rSMR. When df=1, the convergence of the routines requires np>250 to obtain the desired result accurately. The Midrange distribution has density

$$f(q; n, \nu) = \int_0^\infty \int_{-\infty}^{\infty} 2n(n - 1)x\phi(y)\phi(2xq - y)[\Phi(2xq - y) - \Phi(y)]^{n-2}f(x; \nu)dxdy,$$

where, $q$ is the quantile of externally studentized midrange distribution, $n$ (size) is the sample size and $\nu$ is the degrees of freedom.

The externally studentized midrange distribution function is given by

$$F(q; n, \nu) = \int_0^q \int_{-\infty}^{\infty} 2n(n - 1)x\phi(y)\phi(2xz - y)[\Phi(2xz - y) - \Phi(y)]^{n-2}f(x; \nu)dxdz.$$

where, $q$ is the quantile of externally studentized midrange distribution, $n$ (size) is the sample size and $\nu$ is the degrees of freedom.

Value

dSMR gives the density, pSMR gives the cumulative distribution function, qSMR gives the quantile function, and rSMR generates random deviates.

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References

Batista, BDO; Ferreira, DF. The externally studentized normal midrange distribution. Submitted for publications. 2012.

See Also

Package homepage: <www.dex.ufla.br/~danielff/r_resources.html>

Examples

library(SMR)

#example 1:
x <- 2
q <- 1
p <- 0.9
n <- 30
size <- 5
df <- 3
np <- 32
dSMR(x, size, df, np)
pSMR(q, size, df, np)
qSMR(p, size, df, np)
rSMR(n, size, df)

#example 2:
x <- c(-1, 2, 1.1)
q <- c(1, 0, -1.5)
p <- c(0.9, 1, 0.8)
n <- 10
size <- 5
df <- 3
np <- 32
dSMR(x, size, df, np)
pSMR(q, size, df, np)
qSMR(p, size, df, np)
rSMR(n, size, df)
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