Package ‘new.dist’

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Title Alternative Univariate and Multivariate Distributions

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Description The aim is to develop an R package, which is new.dist package, for the probability (density) function, the distribution function, the quantile function and the associated random number generation function for discrete and continuous distributions, which have recently been proposed in the literature. This package implements the following distributions: The Power Muth Distribution, A Bimodal Weibull Distribution, The Discrete Lindley Distribution, The Gamma-Lomax Distribution, Weighted Geometric Distribution, A Power Log-Dagum Distribution, Kumaraswamy Distribution, Lindley Distribution, The Unit-Inverse Gaussian Distribution, EP Distribution, Akash Distribution, Ishita Distribution, Maxwell Distribution, The Standard Omega Distribution, Slashed Generalized Rayleigh Distribution, Two-Parameter Rayleigh Distribution, Muth Distribution, Uniform-Geometric Distribution, Discrete Weibull Distribution.

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URL https://github.com/akmn35/new.dist, https://akmn35.github.io/new.dist/

BugReports https://github.com/akmn35/new.dist/issues

Imports VGAM,
expint,
pracma

Suggests knitr,
rmarkdown,
roxygen2,
stats,
testthat (>= 3.0.0)

VignetteBuilder knitr

RdMacros

Config/testthat/edition 3

Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

RoxygenNote 7.2.3

R topics documented:

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bwd *A Bimodal Weibull Distribution*

Description

Density, distribution function, quantile function and random generation for a Bimodal Weibull Distribution with parameters shape and scale.

Usage

```
dbwd(x, alpha, beta = 1, sigma, log = FALSE)

pbwd(q, alpha, beta = 1, sigma, lower.tail = TRUE, log.p = FALSE)

qbwd(p, alpha, beta = 1, sigma, lower.tail = TRUE)

rbwd(n, alpha, beta = 1, sigma)
```

Arguments

`x, q`	vector of quantiles.
`alpha`	a shape parameter.
`beta`	a scale parameter.
`sigma`	the parameter that controls the uni- or bimodality of the distribution.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

A Bimodal Weibull distribution with `shape` parameter α, `scale` parameter β and the parameter that `controls` the uni- or bimodality of the distribution σ, has density given by

$$f\left(x\right)=\frac{\alpha}{\beta Z_{\theta}}\left[1+\left(1-\sigma\, x\right)^{2}\right]\left(\frac{x}{\beta}\right)^{\alpha-1}\exp\left(-\left(\frac{x}{\beta}\right)^{\alpha}\right),$$

where

$$Z_{\theta}=2+\sigma^{2}\beta^{2}\Gamma\left(1+\left(2/\alpha\right)\right)-2\sigma\beta\Gamma\left(1+\left(1/\alpha\right)\right)$$

and

$$x\geq 0,\ \alpha,\beta>0,\ \sigma\in\mathbb{R}.$$

Value

`dbwd` gives the density, `pbwd` gives the distribution function, `qbwd` gives the quantile function and `rbwd` generates random deviates.

References

Vila, R. ve Niyazi Çankaya, M., 2022, *A bimodal Weibull distribution: properties and inference*, Journal of Applied Statistics, 49 (12), 3044-3062.

Examples

```
library(new.dist)
dbwd(1,alpha=2,beta=3,sigma=4)
pbwd(1,alpha=2,beta=3,sigma=4)
qbwd(.7,alpha=2,beta=3,sigma=4)
rbwd(10,alpha=2,beta=3,sigma=4)
```

dld *The discrete Lindley distribution*

Description

Density, distribution function, quantile function and random generation for the discrete Lindley distribution parameter.

Usage

```
ddld(x, theta, log = FALSE)

pdld(q, theta, lower.tail = TRUE, log.p = FALSE)

qdld(p, theta, lower.tail = TRUE)

rdld(n, theta)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The discrete Lindley distribution with a parameter θ, has density given by

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

where

$$x=0,1,...,\ \theta>0,\ \lambda=e^{-\theta}.$$

Value

`ddld` gives the density, `pdld` gives the distribution function, `qdld` gives the quantile function and `rdld` generates random deviates.

References

Gómez-Déniz, E. ve Calderín-Ojeda, E., 2011, *The discrete Lindley distribution: properties and applications*.Journal of statistical computation and simulation, 81 (11), 1405-1416.

Examples

```
library(new.dist)
ddld(1,theta=2)
pdld(2,theta=1)
qdld(.993,theta=2)
rdld(10,theta=1)
```

---

emd *Estimation in Maxwell distribution with randomly censored data*

Description

Density, distribution function, quantile function and random generation for Estimation in Maxwell distribution with parameter `scale`.

Usage

```
demd(x, theta = 1, log = FALSE)

pemd(q, theta = 1, lower.tail = TRUE, log.p = FALSE)

qemd(p, theta = 1, lower.tail = TRUE)

remd(n, theta = 1)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a scale parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X\leq x\right]$, otherwise,$P\left[X>x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

Estimation in Maxwell distribution with `scale` parameter θ, has density

$$f\left(x\right)=\frac{4}{\sqrt{\pi}}\frac{1}{\theta^{3/2}}x^{2}e^{-x^{2}/\theta},$$

where

$$0\leq x<\infty,\ \ \theta>0.$$

Value

`demd` gives the density, `pemd` gives the distribution function, `qemd` gives the quantile function and `remd` generates random deviates.

References

Krishna, H., Vivekanand ve Kumar, K., 2015, *Estimation in Maxwell distribution with randomly censored data*, Journal of statistical computation and simulation, 85 (17), 3560-3578.

Examples

```
library(new.dist)
demd(1,theta=2)
pemd(1,theta=2)
qemd(.4,theta=5)
remd(10,theta=1)
```

EPd *The EP distribution*

Description

Density, distribution function, quantile function and random generation for the EP distribution parameters.

Usage

```
dEPd(x, lambda, beta, log = FALSE)

pEPd(q, lambda, beta, lower.tail = TRUE, log.p = FALSE)

qEPd(p, lambda, beta, lower.tail = TRUE)

rEPd(n, lambda, beta)
```

Arguments

`x, q`	vector of quantiles.
`lambda, beta`	are parameters.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The EP distribution with parameters are λ, β, has density given by

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

where

$$x > \mathbb{R}_{+}, \ \beta, \lambda \in \mathbb{R}_{+}.$$

Value

`dEPd` gives the density, `pEPd` gives the distribution function, `qEPd` gives the quantile function and `rEPd` generates random deviates.

References

Kuş, C., 2007, *A new lifetime distribution*, Computational Statistics & Data Analysis, 51 (9), 4497-4509.

Examples

```
library(new.dist)
dEPd(1, lambda=2, beta=3)
pEPd(1,lambda=2,beta=3)
qEPd(.8,lambda=2,beta=3)
rEPd(10,lambda=2,beta=3)
```

---

epkd — *Estimation procedures for kumaraswamy distribution parameters under adaptive type-II hybrid progressive censoring*

Description

Density, distribution function, quantile function and random generation for Estimation procedures for kumaraswamy distribution with parameters `shapes`.

Usage

```
depkd(x, lambda, alpha, log = FALSE)

pepkd(q, lambda, alpha, lower.tail = TRUE, log.p = FALSE)

qepkd(p, lambda, alpha, lower.tail = TRUE)

repkd(n, lambda, alpha)
```

Arguments

`x, q`	vector of quantiles.
`alpha, lambda`	are non-negative shape parameters.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

Estimation procedures for kumaraswamy distribution with non-negative shape parameters α, λ has density given by

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

where

$$0 < x < 1, \;\; \alpha, \lambda > 0.$$

Value

`depkd` gives the density, `pepkd` gives the distribution function, `qepkd` gives the quantile function and `repkd` generates random deviates.

References

Kohansal, A. ve Bakouch, H. S., 2021, *Estimation procedures for Kumaraswamy distribution parameters under adaptive type-II hybrid progressive censoring*, Communications in Statistics-Simulation and Computation, 50 (12), 4059-4078.

Examples

```
library("new.dist")
depkd(0.1,lambda=2,alpha=3)
pepkd(0.5,lambda=2,alpha=3)
qepkd(.8,lambda=2,alpha=3)
repkd(10,lambda=2,alpha=3)
```

`gld` *The gamma-Lomax distribution*

Description

Density, distribution function, quantile function and random generation for the gamma-Lomax distribution with parameters `shapes` and `scale`.

Usage

```
dgld(x, a, alpha, beta = 1, log = FALSE)

pgld(q, a, alpha, beta = 1, lower.tail = TRUE, log.p = FALSE)

qgld(p, a, alpha, beta = 1, lower.tail = TRUE)

rgld(n, a, alpha, beta = 1)
```

Arguments

`x, q`	vector of quantiles.
`a, alpha`	are shape parameters.
`beta`	a scale parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).

`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X\leq x\right]$, otherwise,$P\left[X>x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The gamma-Lomax distribution `shape` parameters are a,α and `scale` parameter is β, has density given by

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

where

$$x>0,\ a,\alpha,\beta>0.$$

Value

`dgld` gives the density, `pgld` gives the distribution function, `qgld` gives the quantile function and `rgld` generates random deviates.

References

Cordeiro, G. M., Ortega, E. M. ve Popović, B. V., 2015, *The gamma-Lomax distribution*, Journal of statistical computation and simulation, 85 (2), 305-319.

Ristić, M. M., & Balakrishnan, N. (2012), *The gamma-exponentiated exponential distribution. Journal of statistical computation and simulation* , 82(8), 1191-1206.

Examples

```
library(new.dist)
dgld(1, a=2, alpha=3, beta=4)
pgld(1,a=2,alpha=3,beta=4)
qgld(.8,a=2,alpha=3,beta=4)
rgld(10,a=2,alpha=3,beta=4)
```

`ndd` *A new discrete distribution*

Description

Density, distribution function, quantile function and random generation for a new discrete distribution parameter.

Usage

```
dndd(x, theta, log = FALSE)

pndd(q, theta, lower.tail = TRUE, log.p = FALSE)

qndd(p, theta, lower.tail = TRUE)

rndd(n, theta)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

A new discrete distribution with a parameter θ, has density given by

$$f\left(x\right) = \frac{\lambda^x}{1+\theta}\left(\theta\left(1-2\lambda\right) + \left(1-\lambda\right)\left(1+\theta x\right)\right),$$

where

$$x = 0, 1, 2, ... , \lambda = \exp\left(-\theta\right),\ \theta > 0.$$

Value

`dndd` gives the density, `pndd` gives the distribution function, `qndd` gives the quantile function and `rndd` generates random deviates.

References

Bakouch, H. S., Jazi, M. A. ve Nadarajah, S., 2014, *A new discrete distribution, Statistics*, 48 (1), 200-240.

Examples

```
library(new.dist)
dndd(2,theta=2)
pndd(1,theta=2)
qndd(.5,theta=2)
rndd(10,theta=1)
```

---

noPDD *A new one parameter discrete distribution and its applications*

Description

Density, distribution function, quantile function and random generation for a new one parameter discrete distribution with parameter `scale`.

Usage

```
dnoPDD(x, theta = 1, log = FALSE)

pnoPDD(q, theta = 1, lower.tail = TRUE, log.p = FALSE)

qnoPDD(p, theta = 1, lower.tail = TRUE)

rnoPDD(n, theta = 1)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a scale parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P[X \leq x]$, otherwise,$P[X > x]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

A new one parameter discrete distribution with `scale` parameter θ, has density given by

$$f(x) = \frac{\theta^6}{\theta^6 + 120}\left(\theta + x^5\right)e^{-\theta x},$$

where

$$x > 0,\ \theta > 0.$$

Value

`dnoPDD` gives the density, `pnoPDD` gives the distribution function, `qnoPDD` gives the quantile function and `rnoPDD` generates random deviates.

References

Shukla, K. K., Shanker, R. ve Tiwari, M. K., 2022, *A new one parameter discrete distribution and its applications*, Journal of Statistics and Management Systems, 25 (1), 269-283.

Examples

```
library(new.dist)
dnoPDD(1,theta=2)
pnoPDD(1,theta=2)
qnoPDD(.1,theta=1)
rnoPDD(10,theta=1)
```

---

omd *on the muth distribution*

Description

Density, distribution function, quantile function and random generation for on the muth distribution distribution parameter.

Usage

```
domd(x, alpha, log = FALSE)

pomd(q, alpha, lower.tail = TRUE, log.p = FALSE)

qomd(p, alpha, lower.tail = TRUE)

romd(n, alpha)
```

Arguments

`x, q`	vector of quantiles.
`alpha`	a parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

On the muth distribution distribution with a parameter α, has density given by

$$f\left(x\right) = \left(e^{\alpha x} - \alpha\right) e^{\alpha x - (1/\alpha)(e^{\alpha x} - 1)},$$

where

$$x > 0,\ \alpha \in \left(0, 1\right].$$

Value

`domd` gives the density, `pomd` gives the distribution function, `qomd` gives the quantile function and `romd` generates random deviates.

References

Jodrá, P., Jiménez-Gamero, M. D. ve Alba-Fernández, M. V., 2015, *On the Muth distribution, Mathematical Modelling and Analysis*, 20 (3), 291-310.

Examples

```
library(new.dist)
domd(1,alpha=.2)
pomd(1,alpha=.2)
qomd(.8,alpha=.1)
romd(10,alpha=1)
```

`pldd` *A Power Log Dagum Distribution*

Description

Density, distribution function, quantile function and random generation for a Power Log Dagum distribution parameters.

Usage

```
dpldd(x, alpha, beta, theta, log = FALSE)

ppldd(q, alpha, beta, theta, lower.tail = TRUE, log.p = FALSE)

qpldd(p, alpha, beta, theta, lower.tail = TRUE)

rpldd(n, alpha, beta, theta)
```

Arguments

`x, q`	vector of quantiles.
`alpha, beta, theta`	are parameters.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P[X \leq x]$, otherwise,$P[X > x]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

A Power Log Dagum Distribution with parameters α, β, θ, has density given by

$$f(x) = \alpha \left(\beta + \theta |x|^{\beta-1}\right) e^{-\left(\beta x + sign(x)(\theta/\beta)|x|^{\beta}\right)} \left(1 + e^{-\left(\beta x + sign(x)(\theta/\beta)|x|^{\beta}\right)}\right)^{-(\alpha+1)},$$

where

$$x \in \mathbb{R},\ \beta \in \mathbb{R},\ \alpha > 0,\ \theta \geq 0$$

Value

`dpldd` gives the density, `ppldd` gives the distribution function, `qpldd` gives the quantile function and `rpldd` generates random deviates.

Note

The distributions hazard function

$$h(x) = \frac{\alpha \left(\beta + \theta |x|^{\beta-1}\right) e^{-\left(\beta x + sign(x)(\theta/\beta)|x|^{\beta}\right)} \left(1 + e^{-\left(\beta x + sign(x)(\theta/\beta)|x|^{\beta}\right)}\right)^{-(\alpha+1)}}{1 - \left(1 + e^{-\left(\beta x + sign(x)(\theta/\beta)|x|^{\beta}\right)}\right)^{-\alpha}}.$$

References

Bakouch, H. S., Khan, M. N., Hussain, T. ve Chesneau, C., 2019, *A power log-Dagum distribution: estimation and applications*, Journal of Applied Statistics, 46 (5), 874-892.

Examples

```
library(new.dist)
dpldd(1, alpha=2, beta=3, theta=4)
ppldd(1,alpha=2,beta=3,theta=4)
qpldd(.8,alpha=2,beta=3,theta=4)
rpldd(10,alpha=2,beta=3,theta=4)
```

`rld` *Inferences on stress–strength reliability based on ranked set sampling data incase of Lindley distribution*

Description

Density, distribution function, quantile function and random generation for Inferences on stress–strength reliability based on ranked set sampling data incase of Lindley distributions parameter.

Usage

```
drld(x, theta, log = FALSE)

prld(q, theta, lower.tail = TRUE, log.p = FALSE)

qrld(p, theta, lower.tail = TRUE)

rrld(n, theta)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X\leq x\right]$, otherwise,$P\left[X>x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

Inferences on stress–strength reliability based on ranked set sampling data incase of Lindley distribution with a parameter θ, has density given by

$$f\left(x\right)=\frac{\theta^2}{1+\theta}\left(1+x\right)e^{-\theta\ x},$$

where

$$x>0,\ \theta>0.$$

Value

`drld` gives the density, `prld` gives the distribution function, `qrld` gives the quantile function and `rrld` generates random deviates.

References

Akgül, F. G., Acıtaş, Ş. ve Şenoğlu, B., 2018, *Inferences on stress–strength reliability based on ranked set sampling data in case of Lindley distribution*, Journal of statistical computation and simulation, 88 (15), 3018-3032.

Examples

```
library(new.dist)
drld(1,theta=2)
prld(1,theta=2)
qrld(.8,theta=1)
rrld(10,theta=1)
```

---

sgrd *Slashed generalized Rayleigh distribution*

Description

Density, distribution function, quantile function and random generation for the Slashed generalized Rayleigh distribution with parameters `shape`, `scale`, `kurtosis`.

Usage

```
dsgrd(x, theta, alpha, beta, log = FALSE)

psgrd(q, theta, alpha, beta, lower.tail = TRUE, log.p = FALSE)

qsgrd(p, theta, alpha, beta, lower.tail = TRUE)

rsgrd(n, theta, alpha, beta)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a scale parameter.
`alpha`	a shape parameter.
`beta`	a kurtosis parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Slashed generalized Rayleigh distribution with `shape` parameter α, `scale` parameter θ and `kurtosis` parameter β, has density given by

$$f\left(x\right) = \frac{\beta x^{-(\beta+1)}}{\Gamma\left(\alpha+1\right)\theta^{\beta/2}}\Gamma\left(\frac{2\alpha+\beta+2}{2}\right)F\left(\theta x^2;\frac{2\alpha+\beta+2}{2},1\right),$$

where F(.;a,b) is the cdf of the Gamma (a,b) distribution, and

$$x > 0,\ \theta > 0,\ \alpha > -1,\ \beta > 0$$

Value

dsgrd gives the density, psgrd gives the distribution function, qsgrd gives the quantile function and rsgrd generates random deviates.

References

Iriarte, Y. A., Vilca, F., Varela, H. ve Gómez, H. W., 2017, *Slashed generalized Rayleigh distribution*, Communications in Statistics- Theory and Methods, 46 (10), 4686-4699.

Examples

```
library(new.dist)
dsgrd(2,theta=3,alpha=1,beta=4)
psgrd(5,theta=3,alpha=1,beta=4)
qsgrd(.4,theta=3,alpha=1,beta=4)
rsgrd(10,theta=3,alpha=1,beta=4)
```

---

sod *On parameter estimation of the standard omega distribution*

Description

Density, distribution function, quantile function and random generation for On parameter estimation of the standard omega distributions parameters.

Usage

```
dsod(x, alpha, beta, log = FALSE)

psod(q, alpha, beta, lower.tail = TRUE, log.p = FALSE)

qsod(p, alpha, beta, lower.tail = TRUE)

rsod(n, alpha, beta)
```

Arguments

x, q	vector of quantiles.
alpha, beta	are parameters.
log, log.p	logical; if TRUE, probabilities p are given as log(p).
lower.tail	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
p	vector of probabilities.
n	number of observations. If length(n) > 1, the length is taken to be the number required.

Details

On parameter estimation of the standard omega distribution with parameters α, β, has density given by

$$f(x) = \alpha\beta x^{\beta-1}\frac{1}{1-x^{2\beta}}\left(\frac{1+x^{\beta}}{1-x^{\beta}}\right)^{-\alpha/2},$$

where

$$0 < x < 1,\ \alpha, \beta > 0.$$

Value

dsod gives the density, psod gives the distribution function, qsod gives the quantile function and rsod generates random deviates.

References

Birbiçer, İ. ve Genç, A. İ., 2022, *On parameter estimation of the standard omega distribution*. Journal of Applied Statistics, 1-17.

Examples

```
library(new.dist)
dsod(0.4, alpha=1, beta=2)
psod(0.4, alpha=1, beta=2)
qsod(.8, alpha=1, beta=2)
rsod(10, alpha=1, beta=2)
```

---

tpmd *The Power Muth Distribution*

Description

Density, distribution function, quantile function and random generation for the Power Muth distribution with parameters shape and scale.

Usage

```
dtpmd(x, beta = 1, alpha, log = FALSE)

ptpmd(q, beta = 1, alpha, lower.tail = TRUE, log.p = FALSE)

qtpmd(p, beta = 1, alpha, lower.tail = TRUE)

rtpmd(n, beta = 1, alpha)
```

Arguments

x, q	vector of quantiles.
beta	a scale parameter.
alpha	a shape parameter.
log, log.p	logical; if TRUE, probabilities p are given as log(p).

`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Power Muth Distribution with `shape` parameter α and `scale` parameter β has density given by

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

where

$$x > 0,\ \alpha, \beta > 0.$$

Value

`dtpmd` gives the density, `ptpmd` gives the distribution function, `qtpmd` gives the quantile function and `rtpmd` generates random deviates.

Note

Hazard function;

$$h\left(\beta, \alpha\right) = \frac{\alpha}{\beta^{\alpha}} \left(e^{(x/\beta)^{\alpha}} - 1\right) x^{\alpha-1}$$

References

Jodra, P., Gomez, H. W., Jimenez-Gamero, M. D., & Alba-Fernandez, M. V. (2017). *The power Muth distribution* . Mathematical Modelling and Analysis, 22(2), 186-201.

Examples

```
library(new.dist)
dtpmd(1, beta=2, alpha=3)
ptpmd(1,beta=2,alpha=3)
qtpmd(.5,beta=2,alpha=3)
rtpmd(10,beta=2,alpha=3)
```

`tprd` *Two-Parameter Rayleigh Distribution*

Description

Density, distribution function, quantile function and random generation for the Two-Parameter Rayleigh distribution with parameters `location` and `scale`.

Usage

```
dtprd(x, lambda = 1, mu, log = FALSE)

ptprd(q, lambda = 1, mu, lower.tail = TRUE, log.p = FALSE)

qtprd(p, lambda = 1, mu, lower.tail = TRUE)

rtprd(n, lambda = 1, mu)
```

Arguments

`x, q`	vector of quantiles.
`lambda`	a scale parameter.
`mu`	a location parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Two-Parameter Rayleigh distribution with `scale` parameter λ and `location` parameter μ, has density given by

$$f\left(x\right) = 2\lambda\left(x-\mu\right)e^{-\lambda\left(x-\mu\right)^2},$$

where

$$x > \mu,\ \lambda > 0.$$

Value

`dtprd` gives the density, `ptprd` gives the distribution function, `qtprd` gives the quantile function and `rtprd` generates random deviates.

References

Dey, S., Dey, T. ve Kundu, D., 2014, *Two-parameter Rayleigh distribution: different methods of estimation*, American Journal of Mathematical and Management Sciences, 33 (1), 55-74.

Examples

```
library(new.dist)
dtprd(5, lambda=4, mu=4)
ptprd(2,lambda=2,mu=1)
qtprd(.5,lambda=2,mu=1)
rtprd(10,lambda=2,mu=1)
```

---

ugd *Uniform-Geometric distribution*

Description

Density, distribution function, quantile function and random generation for the Uniform-Geometric distributions parameter.

Usage

```
dugd(x, theta, log = FALSE)

pugd(q, theta, lower.tail = TRUE, log.p = FALSE)

qugd(p, theta, lower.tail = TRUE)

rugd(n, theta)
```

Arguments

`x, q`	vector of quantiles.
`theta`	a parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X \leq x\right]$, otherwise,$P\left[X > x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Uniform-Geometric distribution with shape parameter θ, has density given by

$$f\left(x\right) = \theta \left(1-\theta\right)^{x-1} LerchPhi\left[\left(1-\theta\right), 1, x\right],$$

where

$$LerchPhi\left(z, a, v\right) = \sum_{n=0}^{\infty} \frac{z^n}{\left(v+n\right)^a}$$

and

$$x = 1, 2, ..., \;\; 0 < \theta < 1.$$

Value

`dugd` gives the density, `pugd` gives the distribution function, `qugd` gives the quantile function and `rugd` generates random deviates.

References

Akdoğan, Y., Kuş, C., Asgharzadeh, A., Kınacı, İ., & Sharafi, F. (2016). *Uniform-geometric distribution*. Journal of Statistical Computation and Simulation, 86(9), 1754-1770.

Examples

```
library(new.dist)
dugd(1, theta=0.5)
pugd(1,theta=.5)
qugd(0.6,theta=.1)
rugd(10,theta=.1)
```

uigd *The unit inverse Gaussian distribution A new alternative to two parameter distributions on the unit interval*

Description

Density, distribution function, quantile function and random generation for the unit inverse Gaussian distribution A new alternative to two parameter distribution with parameters `mean` and `scale`.

Usage

```
duigd(x, mu, lambda = 1, log = FALSE)

puigd(q, mu, lambda = 1, lower.tail = TRUE, log.p = FALSE)

quigd(p, mu, lambda = 1, lower.tail = TRUE)

ruigd(n, mu, lambda = 1)
```

Arguments

`x, q`	vector of quantiles.
`mu`	a mean parameter.
`lambda`	a scale parameter.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P[X \leq x]$, otherwise,$P[X > x]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The unit inverse Gaussian distribution A new alternative to two parameter distribution with `scale` parameter λ and `mean` parameter μ, has density given by

$$f(x) = \sqrt{\frac{\lambda}{2\pi}}\frac{1}{x^{3/2}}e^{-\frac{\lambda}{2\mu^2 x}(x-\mu)^2},$$

where

$$x > 0,\ \mu, \lambda > 0.$$

Value

`duigd` gives the density, `puigd` gives the distribution function, `quigd` gives the quantile function and `ruigd` generates random deviates.

References

Ghitany, M., Mazucheli, J., Menezes, A. ve Alqallaf, F., 2019, *The unit-inverse Gaussian distribution: A new alternative to two-parameter distributions on the unit interval, Communications in Statistics-Theory and Methods*, 48 (14), 3423-3438.

Examples

```
library(new.dist)
duigd(1, mu=2, lambda=3)
puigd(1,mu=2,lambda=3)
quigd(.1,mu=2,lambda=3)
ruigd(10,mu=2,lambda=3)
```

---

wgd *Weighted Geometric Distribution*

Description

Density, distribution function, quantile function and random generation for the Weighted Geometric distributions parameters.

Usage

```
dwgd(x, alpha, lambda, log = FALSE)

pwgd(q, alpha, lambda, lower.tail = TRUE, log.p = FALSE)

qwgd(p, alpha, lambda, lower.tail = TRUE)

rwgd(n, alpha, lambda)
```

Arguments

`x, q`	vector of quantiles.
`alpha, lambda`	are parameters.
`log, log.p`	logical; if TRUE, probabilities p are given as log(p).
`lower.tail`	logical; if TRUE (default), probabilities are $P\left[X\leq x\right]$, otherwise,$P\left[X>x\right]$.
`p`	vector of probabilities.
`n`	number of observations. If `length(n) > 1`, the length is taken to be the number required.

Details

The Weighted Geometric distribution with parameters α and λ, has density given by

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

where

$$x\in\mathbb{N}=1,2,\dots,\ \lambda>0,\ 0<\alpha<1.$$

Value

`dwgd` gives the density, `pwgd` gives the distribution function, `qwgd` gives the quantile function and `rwgd` generates random deviates.

References

Najarzadegan, H., Alamatsaz, M. H., Kazemi, I. ve Kundu, D., 2020, *Weighted bivariate geometric distribution: Simulation and estimation*, Communications in Statistics-Simulation and Computation, 49 (9), 2419-2443.

Examples

```
library(new.dist)
dwgd(1,alpha=.2,lambda=3)
pwgd(1,alpha=.2,lambda=3)
qwgd(.98,alpha=.2,lambda=3)
rwgd(10,alpha=.2,lambda=3)
```

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