

# Package ‘new.dist’

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**Title** Alternative Continuous and Discrete Distributions

**Version** 0.1.1

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**Description** The aim is to develop an R package, which is the '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.

**License** GPL-3

**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

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bwd	<i>Bimodal Weibull Distribution</i>
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### 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	a control 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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

A Bimodal Weibull distribution with shape parameter  $\alpha$ , scale parameter  $\beta$ , and the control parameter  $\sigma$  that determines the uni- or bimodality of the distribution, has density

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

where

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

and

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

**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)
```

dLd1

*Discrete Lindley Distribution***Description**

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

**Usage**

```
ddLd1(x, theta, log = FALSE)
```

```
pdLd1(q, theta, lower.tail = TRUE, log.p = FALSE)
```

```
qdLd1(p, theta, lower.tail = TRUE)
```

```
rdLd1(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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Discrete Lindley distribution with a parameter  $\theta$ , has density

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

where

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

**Value**

ddLd1 gives the density, pdLd1 gives the distribution function, qdLd1 gives the quantile function and rdLd1 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)
ddLd1(1, theta=2)
pdLd1(2, theta=1)
qdLd1(.993, theta=2)
rdLd1(10, theta=1)
```

dLd2

*Discrete Lindley Distribution***Description**

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

**Usage**

```
ddLd2(x, theta, log = FALSE)

pdLd2(q, theta, lower.tail = TRUE, log.p = FALSE)

qdLd2(p, theta, lower.tail = TRUE)

rdLd2(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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

the discrete Lindley distribution with a parameter  $\theta$ , has density

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

where

$$x = 0, 1, 2, \dots, \lambda = \exp(-\theta) \text{ and } \theta > 0.$$

**Value**

ddLd2 gives the density, pdLd2 gives the distribution function, qdLd2 gives the quantile function and rdLd2 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)
ddLd2(2, theta=2)
pdLd2(1, theta=2)
qdLd2(.5, theta=2)
rdLd2(10, theta=1)
```

---

 EPd

---

*EP distribution*


---

**Description**

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

**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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The EP distribution with parameters  $\lambda$  and  $\beta$ , has density

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

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)
```

---

gld

*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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Gamma-Lomax distribution shape parameters  $a$  and  $\alpha$ , and scale parameter is  $\beta$ , has density

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

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)
```

---

 kd *Kumaraswamy Distribution*


---

**Description**

Density, distribution function, quantile function and random generation for Kumaraswamy distribution with shape parameters.

**Usage**

dkd(x, lambda, alpha, log = FALSE)

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

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

rkd(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 $P[X \leq x]$ , 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**

Kumaraswamy distribution with non-negative shape parameters  $\alpha$  and  $\lambda$  has density

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

where

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

**Value**

dkd gives the density, pkd gives the distribution function, qkd gives the quantile function and rkd 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")
dkd(0.1,lambda=2,alpha=3)
pkd(0.5,lambda=2,alpha=3)
qkd(.8,lambda=2,alpha=3)
rkd(10,lambda=2,alpha=3)
```

Ld

*Lindley Distribution***Description**

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

**Usage**

```
dLd(x, theta, log = FALSE)
pLd(q, theta, lower.tail = TRUE, log.p = FALSE)
qLd(p, theta, lower.tail = TRUE)
rLd(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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Lindley distribution with a parameter  $\theta$ , has density

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

where

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

**Value**

dLd gives the density, pLd gives the distribution function, qLd gives the quantile function and rLd 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)
dLd(1,theta=2)
pLd(1,theta=2)
qLd(.8,theta=1)
rLd(10,theta=1)
```

---

md	<i>Maxwell Distribution</i>
----	-----------------------------

---

## Description

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

## Usage

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

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

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

rmd(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 $\text{length}(n) > 1$ , the length is taken to be the number required.

## Details

Maxwell distribution with scale parameter  $\theta$ , has density

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

where

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

**Value**

dmd gives the density, pmd gives the distribution function, qmd gives the quantile function and rmd 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)
dmd(1,theta=2)
pmd(1,theta=2)
qmd(.4,theta=5)
rmd(10,theta=1)
```

---

omd

*Muth Distribution*


---

**Description**

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

**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 $P[X \leq x]$ , 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 Muth distribution with a parameter  $\alpha$ , has density

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

where

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

**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

*Power Log Dagum Distribution*

---

**Description**

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

**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 $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

A Power Log Dagum Distribution with parameters  $\alpha$ ,  $\beta$  and  $\theta$ , has density

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

where

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

**Value**

dppldd gives the density, pppldd gives the distribution function, qppldd gives the quantile function and rppldd generates random deviates.

**Note**

The distributions hazard function

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

**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)
dppldd(1, alpha=2, beta=3, theta=4)
pppldd(1, alpha=2, beta=3, theta=4)
qppldd(.8, alpha=2, beta=3, theta=4)
rppldd(10, alpha=2, beta=3, theta=4)
```

---

RA *Ram Awadh Distribution*


---

**Description**

Density, distribution function, quantile function and random generation for a Ram Awadh distribution with parameter scale.

**Usage**

dRA(x, theta = 1, log = FALSE)

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

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

rRA(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**

Ram Awadh distribution with scale parameter  $\theta$ , has density

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

where

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

**Value**

dRA gives the density, pRA gives the distribution function, qRA gives the quantile function and rRA 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)
dRA(1,theta=2)
pRA(1,theta=2)
qRA(.1,theta=1)
rRA(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 and 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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Slashed Generalized Rayleigh distribution with shape parameter  $\alpha$ , scale parameter  $\theta$  and kurtosis parameter  $\beta$ , has density

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

where  $F(\cdot; a, b)$  is the cdf of the Gamma (a,b) distribution, and

$$x > 0, \theta > 0, \alpha > -1 \text{ and } \beta > 0$$

**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

*Standard Omega Distribution*


---

**Description**

Density, distribution function, quantile function and random generation for the Standard Omega distribution.

**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 $P[X \leq x]$ , 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 Standard Omega distribution with parameters  $\alpha$  and  $\beta$ , has density

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

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

*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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Power Muth distribution with shape parameter  $\alpha$  and scale parameter  $\beta$  has density

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

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;

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

**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 $P[X \leq x]$ , 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 Two-Parameter Rayleigh distribution with scale parameter  $\lambda$  and location parameter  $\mu$ , has density

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

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 distribution.

**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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Uniform-Geometric distribution with shape parameter  $\theta$ , has density

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

where

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

and

$$x = 1, 2, \dots, \quad 0 < \theta < 1.$$

**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., Kinacı, 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

*Unit Inverse Gaussian Distribution*


---

**Description**

Density, distribution function, quantile function and random generation for the Unit Inverse Gaussian distribution mean and scale.

**Usage**

```
duigd(x, mu, lambda = 1, log = FALSE)
puidg(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 $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Unit Inverse Gaussian distribution scale parameter  $\lambda$  and mean parameter  $\mu$ , has density

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

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 distribution.

**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 $P[X \leq x]$ , otherwise, $P[X > x]$ .
p	vector of probabilities.
n	number of observations. If $\text{length}(n) > 1$ , the length is taken to be the number required.

**Details**

The Weighted Geometric distribution with parameters  $\alpha$  and  $\lambda$ , has density

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

where

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

**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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