

# Package ‘ncg’

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**Type** Package

**Title** Computes the noncentral gamma function

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**Description** Computes the noncentral gamma function: pdf, cdf, quantile  
function and inverse for the noncentrality parameter.

**License** GPL (>= 2)

**URL** [www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)

**Repository** CRAN

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deltagammanc	<i>Computes the noncentrality parameter delta of the noncentral gamma function</i>
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### Description

Computes the noncentrality parameter delta of the noncentral gamma function:

$$I_x(\alpha, \delta) = P(X \leq x) = \sum_{i=0}^{\infty} \frac{e^{-\delta/2} (\delta/2)^i}{i!} I_x(\alpha + i)$$

where  $I_x(\alpha)$  is the central incomplete gamma function,  $\alpha > 0$ ,  $\delta > 0$ ,  $x \geq 0$ .

### Usage

```
deltagammanc(x, alpha, p)
```

### Arguments

x	a vector of positive quantiles.
alpha	a vector of the noncentral gamma parameter, alpha > 0.
p	a vector of cumulative probability values.

### References

Oliveira, IRC; Ferreira, DF Computing the noncentral gamma distribution, its inverse and the non-centrality parameter. Computational Statistics. Submitted for publications. 2012.

### See Also

Package homepage: <[www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)>

### Examples

```
library(ncg)
x    <- c(1.80, 4.98, 7.74)
alpha <- c(1.4, 2.3, 0.7)
p    <- c(0.30, 0.80, 0.75)
deltagammanc(x, alpha, p)
# single values example
deltagammanc(8.0, 1.1, 0.95)
```

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dgammanc	<i>Computes the probability density function of the noncentral gamma function</i>
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### Description

Computes the probability density function of the noncentral gamma function:

$$f(x; \alpha, \delta) = \sum_{i=0}^{\infty} \frac{e^{-\delta/2} (\delta/2)^i}{i!} \left[ \frac{1}{\Gamma(\alpha + i)} e^{-x} x^{\alpha+i-1} \right]$$

where  $\Gamma(\alpha)$  is the central complete gamma function,  $\alpha > 0$ ,  $\delta > 0$ ,  $x \geq 0$ .

### Usage

```
dgammanc(x, alpha, delta)
```

### Arguments

x	a vector of positive quantiles.
alpha	a vector of the noncentral gamma parameter, alpha > 0.
delta	a vector of the noncentrality parameter, delta > 0.

### References

Oliveira, IRC; Ferreira, DF Computing the noncentral gamma distribution, its inverse and the non-centrality parameter. Computational Statistics. Submitted for publications. 2012.

### See Also

Package homepage: <[www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)>

### Examples

```
library(ncg)
x     <- c(2, 3, 2)
alpha <- c(2.5, 1.7, 0.9)
delta <- c(0.5, 0.2, 0.01)
dgammanc(x, alpha, delta)
# single values example
dgammanc(3, 1.9, 0.05)
```

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ncg	<i>Computes the noncentral gamma functions: pdf, cdf, quantiles and noncentrality parameter.</i>
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### Description

Computes the noncentral gamma functions: pdf, cdf, quantiles and noncentrality parameter. This functions uses the mixture of incomplete gamma variable with Poisson weights.

### Details

given x: vector of positive quantiles; alpha > 0 noncentral gamma parameter; and delta: noncentrality parameter

dgammanc(x, alpha, delta) - computes the pdf of the noncetrnal gamma function

pgammanc(x, alpha, delta) - computes the cdf of the noncetrnal gamma function

given p: vector of cumulative probabilities and alpha>0 and delta >0

qgammanc(p, alpha, delta) - computes quantiles of the noncetrnal gamma function

given x: vector of positive quantiles; alpha > 0 noncentral gamma parameter; and  $0 < p < 1$ .

deltagammanc(x, alpha, p) - computes the noncentrality parameter of the noncetrnal gamma function

### Author(s)

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### References

Oliveira, IRC; Ferreira, DF Computing the noncentral gamma distribution, its inverse and the noncentrality parameter. Computational Statistics. Submmited for publications. 2012.

### See Also

Package homepage: <[www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)>

**Examples**

```

library(ncg)
x <- c(2, 3, 2)
alpha <- c(1.5, 1.1, 0.8)
delta <- 2
pgammanc(x, alpha, delta)
dgammaanc(x, alpha, delta)
p <- 0.30
delta <- deltagammanc(x, alpha, p)
delta
p <- c(0.80, 0.98, 0.24)
delta <- 0.2
qgammaanc(p, alpha, delta)

```

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pgammanc	<i>Computes the cumulative distribution function of the noncentral gamma function</i>
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**Description**

Computes the cumulative distribution function of the noncentral gamma function:

$$I_x(\alpha, \delta) = P(X \leq x) = \sum_{i=0}^{\infty} \frac{e^{-\delta/2} (\delta/2)^i}{i!} I_x(\alpha + i)$$

where  $I_x(\alpha)$  is the central incomplete gamma function,  $\alpha > 0$ ,  $\delta > 0$ ,  $x \geq 0$ .

**Usage**

```
pgammanc(x, alpha, delta)
```

**Arguments**

x	a vector of positive quantiles.
alpha	a vector of the noncentral gamma parameter, alpha > 0.
delta	a vector of the noncentrality parameter, delta > 0.

**References**

Oliveira, IRC; Ferreira, DF Computing the noncentral gamma distribution, its inverse and the non-centrality parameter. Computational Statistics. Submitted for publications. 2012.

**See Also**

Package homepage: <[www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)>

**Examples**

```
library(ncg)
x <- c(2, 3, 2)
alpha <- c(1.1, 3.0, 9.0)
delta <- c(1.8, 2.3, 0.5)
pgammanc(x, alpha, delta)
# single values example
pgammanc(2, 2, 0.5)
```

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qgammanc	<i>Computes the probability density function of the noncentral gamma function</i>
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**Description**

Computes quantile of the noncentral gamma function:

$$I_x(\alpha, \delta) = P(X \leq x) = \sum_{i=0}^{\infty} \frac{e^{-\delta/2} (\delta/2)^i}{i!} I_x(\alpha + i)$$

where  $I_x(\alpha)$  is the central incomplete gamma function,  $\alpha > 0$ ,  $\delta > 0$ ,  $x \geq 0$ .

**Usage**

```
qgammanc(p, alpha, delta)
```

**Arguments**

p	a vector of cumulative probability values.
alpha	a vector of the noncentral gamma parameter, alpha > 0.
delta	a vector of the noncentrality parameter, delta > 0.

**References**

Oliveira, IRC; Ferreira, DF Computing the noncentral gamma distribution, its inverse and the non-centrality parameter. Computational Statistics. Submitted for publications. 2012.

**See Also**

Package homepage: <[www.dex.ufla.br/~danielff/r\\_resources.html](http://www.dex.ufla.br/~danielff/r_resources.html)>

**Examples**

```
library(ncg)
p <- c(0.80, 0.98, 0.24)
alpha <- c(1.5, 1.2, 2.1)
delta <- c(0.2, 0.3, 1.5)
qgammanc(p, alpha, delta)
# single values example
qgammanc(0.98, 1.2, 0.3)
```

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