

Package ‘cnbdistr’

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Type Package

Title Conditional Negative Binomial Distribution

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Description Provided R functions for working with the Conditional Negative Binomial distribution.

License GPL-3

Depends R (>= 3.2.2)

Imports hypergeo (>= 1.2-13), stats (>= 3.3.2)

Suggests rmutil (>= 1.1.0), testthat (>= 1.0.2), knitr (>= 1.16),
rmarkdown (>= 1.6)

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dcbn

PMF of Conditional Negative Binomial

Description

Probability mass function of the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r_1, p_1)$ and $Y \sim \text{NB}(r_2, p_2)$ are drawn from two negative binomials, independent of each other, and assuming $p_1/p_2 = \lambda$.

Usage

```
dcbn(x, D, r1, r2, lambda)
```

Arguments

<code>x</code>	a nonempty vector of non-negative integer(s) $\leq D$.
<code>D</code>	a positive integer.
<code>r1</code>	a positive value.
<code>r2</code>	a positive value.
<code>lambda</code>	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

A vector providing values of $\Pr(X = x \mid X + Y = D)$ for each element in `x`.

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[pcnb](#), [qcnb](#), [rcnb](#).

Examples

```
dcbn(980, 2000, 120, 90, 0.994)
dcbn(0:7, 7, 2, 0.4, 0.6)
```

`mu_cnb`*Mean of Conditional Negative Binomial*

Description

Function calculating mean of the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r1, p1)$ and $Y \sim \text{NB}(r2, p2)$ are drawn from two negative binomials, independent of each other, and assuming $p1/p2 = \text{lambda}$.

Usage

```
mu_cnb(D, r1, r2, lambda)
```

Arguments

<code>D</code>	a positive integer.
<code>r1</code>	a positive value.
<code>r2</code>	a positive value.
<code>lambda</code>	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

$E(X | X + Y = D)$.

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[sigma2_cnb](#)

Examples

```
mu_cnb(7, 2, 0.4, 0.6)
```

pcnb

CDF of Conditional Negative Binomial

Description

Cumulative distribution function of the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r_1, p_1)$ and $Y \sim \text{NB}(r_2, p_2)$ are drawn from two negative binomials, independent of each other, and assuming $p_1/p_2 = \lambda$.

Usage

```
pcnb(x, D, r1, r2, lambda)
```

Arguments

<code>x</code>	a nonempty vector of real numbers.
<code>D</code>	a positive integer.
<code>r1</code>	a positive value.
<code>r2</code>	a positive value.
<code>lambda</code>	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

A vector providing values of $\Pr(X \leq x \mid X + Y = D)$ for each element in x .

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[dcbn](#), [qcbn](#), [rcbn](#).

Examples

```
pcnb(980, 2000, 120, 90, 0.994)
pcnb(0:7, 7, 2, 0.4, 0.6)
```

qcnb

Quantile Function of Conditional Negative Binomial

Description

Quantile function of the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r_1, p_1)$ and $Y \sim \text{NB}(r_2, p_2)$ are drawn from two negative binomials, independent of each other, and assuming $p_1/p_2 = \text{lambda}$.

Usage

```
qcnb(p, D, r1, r2, lambda)
```

Arguments

<code>p</code>	a nonempty vector of probabilities ($0 \leq p[i] \leq 1$ for all i).
<code>D</code>	a positive integer.
<code>r1</code>	a positive value.
<code>r2</code>	a positive value.
<code>lambda</code>	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

A vector x such that $x[i] = \text{Inf}\{x \text{ in } 0:D, p[i] \leq \text{Pr}(X \leq x \mid X + Y = D)\}$ for all i .

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[dcbn](#), [pcnb](#), [rcnb](#).

Examples

```
qcnb(0.035193, 2000, 120, 90, 0.994)
qcnb(seq(0, 1, 0.05), 7, 2, 0.4, 0.6)
```

rcnb

Random Number Generation from Conditional Negative Binomial

Description

Random number generation from the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r1, p1)$ and $Y \sim \text{NB}(r2, p2)$ are drawn from two negative binomials, independent of each other, and assuming $p1/p2 = \text{lambda}$.

Usage

```
rcnb(n, D, r1, r2, lambda)
```

Arguments

n	a positive integer.
D	a positive integer.
r1	a positive value.
r2	a positive value.
lambda	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

n iid draws from $X|X+Y=D$.

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[dcbn](#), [pcnb](#), [qcnb](#).

Examples

```
x <- rcnb(1e3, 7, 2, 0.4, 0.6)
hist(x)
```

`sigma2_cnb`*Variance of Conditional Negative Binomial*

Description

Function calculating variance of the conditional distribution of X given $X + Y = D$, where $X \sim \text{NB}(r1, p1)$ and $Y \sim \text{NB}(r2, p2)$ are drawn from two negative binomials, independent of each other, and assuming $p1/p2 = \text{lambda}$.

Usage

```
sigma2_cnb(D, r1, r2, lambda)
```

Arguments

<code>D</code>	a positive integer.
<code>r1</code>	a positive value.
<code>r2</code>	a positive value.
<code>lambda</code>	a positive value.

Details

Need to specify full list of arguments, as default values have not been set.

Value

$V(X | X + Y = D)$.

Author(s)

Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also

[mu_cnb](#)

Examples

```
sigma2_cnb(7, 2, 0.4, 0.6)
```

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