Package ‘cnbdistr’

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Title Conditional Negative Binomial Distribution
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Author Xiaotian Zhu
Maintainer Xiaotian Zhu <xiaotian.zhu.psualum@gmail.com>
Description Provided R functions for working with the Conditional Negative Binomial distribution.
License GPL-3
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dcnb  PMF of Conditional Negative Binomial

Description
Probability mass function of the conditional distribution of X given X + Y = D, where X ~ NB(r1, p1) and Y ~ NB(r2, p2) are drawn from two negative binomials, independent of each other, and assuming p1/p2 = lambda.

Usage
dcnb(x, d, r1, r2, lambda)

Arguments
x  a nonempty vector of non-negative integer(s) <= D.
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
A vector providing values of Pr(X = x | X + Y = D) for each element in x.

Author(s)
Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also
pcnb, qcnb, rcnb.

Examples
dcnb(980, 2000, 120, 90, 0.994)
dcnb(0:7, 7, 2, 0.4, 0.6)
Description
Function calculating mean of the conditional distribution of $X$ given $X + Y = D$, where $X \sim NB(r_1, p_1)$ and $Y \sim NB(r_2, p_2)$ are drawn from two negative binomials, independent of each other, and assuming $p_1/p_2 = \lambda$.

Usage
mu_cnb(D, r1, r2, lambda)

Arguments
- 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
$E(X \mid X + Y = D)$.

Author(s)
Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also
sigma2_cnb

Examples
mu_cnb(7, 2, 0.4, 0.6)
Description

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

Usage

\[ \text{pcnb}(x, D, r_1, r_2, \lambda) \]

Arguments

\( x \)  
a nonempty vector of real numbers.
\( D \)    
a positive integer.
\( r_1 \)  
a positive value.
\( r_2 \)  
a positive value.
\( \lambda \)  
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

dcnb, qcnb, rcnb.

Examples

\[ \text{pcnb}(980, 2000, 120, 90, 0.994) \]
\[ \text{pcnb}(0:7, 7, 2, 0.4, 0.6) \]
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 $p_1/p_2 = \lambda$.

Usage
qcnb(p, d, r1, r2, lambda)

Arguments
- p: a nonempty vector of probabilities ($0 \leq p[i] \leq 1$ for all i).
- 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

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

Author(s)
Xiaotian Zhu, <xiaotian.zhu.psualum@gmail.com>

See Also
dcnb, pcnb, rcnb.

Examples
qcnb(0.035193, 2000, 120, 90, 0.994)
qcnb(seq(0, 1, 0.05), 7, 2, 0.4, 0.6)
Random Number Generation from Conditional Negative Binomial

Description

Random number generation from the conditional distribution of X given X + Y = D, where X ~ NB(r1, p1) and Y ~ NB(r2, p2) are drawn from two negative binomials, independent of each other, and assuming p1/p2 = 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.psu@gmail.com

See Also
dcnb, pcnb, qcnb.

Examples

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

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

Usage

sigma2_cnb(D, r1, r2, lambda)

Arguments

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

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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