Negative hypergeometric distribution (from http://www.math.wm.edu/~leemis/chart/UDR/UDR.html) The shorthand $X \sim$ negative hypergeometric (n_1, n_2, n_3) is used to indicate that the random variable X has the negative hypergeometric distribution with parameters n_1 , n_2 , and n_3 . A negative hypergeometric random variable X with parameters n_1 , n_2 , and n_3 has probability mass function

$$f(x) = \frac{\binom{n_1+x-1}{x}\binom{n_3-n_1+n_2-x-1}{n_2-x}}{\binom{n_3+n_2-1}{n_2}} \qquad x = 0, 1, \dots, n_2$$

for all $n_1 \in \{1, 2, ..., n_2\}$, $n_2, n_3 \in \{1, 2, ...\}$. The probability mass function for $n_1 = 5, n_2 = 20$, and $n_3 = 30$ is illustrated below.



The cumulative distribution, survivor function, hazard function, cumulative hazard function, and inverse distribution function, moment generating function, and characteristic function on the support of X are mathematically intractable.

The population mean, and variance of *X* are

$$E[X] = \frac{n_1 n_2}{n_3} \qquad V[X] = \frac{n_1 n_2 (n_3 + n_2)}{n_3 (n_3 + 1)} \left(1 - \frac{n_1}{n_3}\right)$$

The skewness, and kurtosis of *X* are mathematically intractable.

APPL verification: The APPL statements

return the population mean, variance, skewness, kurtosis, and moment generating function.