

Formulas for Special Discrete Distributions

Dist.	p.d.f.	Mean	Variance	MGF	R code for $p(y)$
Binomial	$\binom{n}{y} p^y (1-p)^{n-y}$	$np$	$np(1-p)$	$(pe^t + (1-p))^n$	<code>dbinom(y,n,p)</code>
Geometric	$p(1-p)^{y-1}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$	$\frac{pe^t}{1-(1-p)e^t}$	<code>dgeo(y,p)</code>
Negative Binomial	$\binom{y-1}{r-1} p^r (1-p)^{y-r}$	$\frac{r}{p}$	$\frac{r(1-p)}{p^2}$	$\left[ \frac{pe^t}{1-(1-p)e^t} \right]^r$	<code>dnbin(y,r,p)</code>
Hypergeometric	$\frac{\binom{r}{y} \binom{N-r}{n-y}}{\binom{N}{n}}$	$\frac{nr}{N}$	$n \left( \frac{r}{N} \right) \left( \frac{N-r}{N} \right) \left( \frac{N-n}{N-1} \right)$	DNE	<code>dhyper(y,r,N-r,n)</code>
Negative Hypergeometric	$\frac{\binom{y-1}{k-1} \binom{N-y}{r-k}}{\binom{N}{r}}$	$k \left( \frac{N+1}{r+1} \right)$	$\frac{k(N+1)(N-r)(r+1-k)}{(r+1)^2(r+2)}$	DNE	<code>dneghyper(y,r,N,k)</code>
Poisson	$\frac{\lambda^y e^{-\lambda}}{y!}$	$\lambda$	$\lambda$	$e^{\lambda(e^t-1)}$	<code>dpois(y,lambda)</code>