Discrete Distributions

Bernoulli
$0 < p < 1$

$f(x) = p^x(1-p)^{1-x}, \qquad x = 0,1$

$M(t) = 1 - p + pe^t, \qquad -\infty < t < \infty$

$\mu = p, \qquad \sigma^2 = p(1-p)$

Binomial
$b(n,p)$
$0 < p < 1$

$f(x) = \dfrac{n!}{x!(n-x)!}p^x(1-p)^{n-x}, \qquad x = 0,1,2,\ldots,n$

$M(t) = (1 - p + pe^t)^n, \qquad -\infty < t < \infty$

$\mu = np, \qquad \sigma^2 = np(1-p)$

Geometric
$0 < p < 1$

$f(x) = (1-p)^{x-1}p, \qquad x = 1,2,3,\ldots$

$M(t) = \dfrac{pe^t}{1 - (1-p)e^t}, \qquad t < -\ln(1-p)$

$\mu = \dfrac{1}{p}, \qquad \sigma^2 = \dfrac{1-p}{p^2}$

Hypergeometric
$N_1 > 0, \ \ N_2 > 0$
$N = N_1 + N_2$

$f(x) = \dfrac{\dbinom{N_1}{x}\dbinom{N_2}{n-x}}{\dbinom{N}{n}}, \qquad x \leq n, \ x \leq N_1, \ n - x \leq N_2$

$\mu = n\left(\dfrac{N_1}{N}\right), \qquad \sigma^2 = n\left(\dfrac{N_1}{N}\right)\left(\dfrac{N_2}{N}\right)\left(\dfrac{N-n}{N-1}\right)$

Negative Binomial
$0 < p < 1$
$r = 1,2,3,\ldots$

$f(x) = \dbinom{x-1}{r-1}p^r(1-p)^{x-r}, \qquad x = r, r+1, r+2, \ldots$

$M(t) = \dfrac{(pe^t)^r}{[1 - (1-p)e^t]^r}, \qquad t < -\ln(1-p)$

$\mu = r\left(\dfrac{1}{p}\right), \qquad \sigma^2 = \dfrac{r(1-p)}{p^2}$

Poisson
$\lambda > 0$

$f(x) = \dfrac{\lambda^x e^{-\lambda}}{x!}, \qquad x = 0,1,2,\ldots$

$M(t) = e^{\lambda(e^t - 1)}, \qquad -\infty < t < \infty$

$\mu = \lambda, \qquad \sigma^2 = \lambda$

Uniform
$m > 0$

$f(x) = \dfrac{1}{m}, \qquad x = 1,2,\ldots,m$

$\mu = \dfrac{m+1}{2}, \qquad \sigma^2 = \dfrac{m^2 - 1}{12}$