Table with common formulas and moment generating functions

Some common mathematical results

$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$

$e^x = \lim_{n \to \infty} \left(1 + \frac{x}{n}\right)^n$

$\sum_{k=0}^{n-1} ar^k = a\frac{1-r^n}{1-r}$ if $r \neq 1$

$\sum_{k=0}^{\infty} ar^k = \frac{a}{1-r}$ if $|r| < 1$

$(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^k y^{n-k}$

Moment generating functions for some common distributions

Distribution	Abbreviation	Moment generating function
Bernoulli	$Be(p)$	$q + pe^t$
Binomial	$Bin(n, p)$	$[q + pe^t]^n$
Poisson	$Po(m)$	$e^{m(e^t - 1)}$
Uniform	$U(a, b)$	$\frac{e^{tb} - e^{ta}}{t(b-a)}$
Exponential	$Exp(a)$	$\frac{1}{1-at}$ for $t < 1/a$
Gamma	$\Gamma(p, a)$	$\frac{1}{(1-at)^p}$ for $t < 1/a$
Laplace	$L(a)$	$\frac{1}{1-a^2t^2}$ for $|t| < 1/a$
Normal	$N(\mu, \sigma^2)$	$e^{t\mu + \sigma^2 t^2/2}$

Some statistical results

$Y|X = x \sim N\left[\mu_y + \rho\frac{\sigma_y}{\sigma_x}(x - \mu_x), \sigma_y^2(1 - \rho^2)\right]$ if Y and X are jointly normal.

$\vec{Y}|\vec{X} = \vec{x} \sim N\left[\vec{\mu}_y + \boldsymbol{\Sigma}_{yx}\boldsymbol{\Sigma}_{xx}^{-1}(\vec{x} - \vec{\mu}_x), \boldsymbol{\Sigma}_{yy} - \boldsymbol{\Sigma}_{yx}\boldsymbol{\Sigma}_{xx}^{-1}\boldsymbol{\Sigma}_{xy}\right]$ if Y and X are jointly normal.