

## Table with common formulas and moment generating functions

### Some common mathematical results

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$$\begin{aligned}
 e^x &= \sum_{n=0}^{\infty} \frac{x^n}{n!} \\
 e^x &= \lim_{n \rightarrow \infty} \left(1 + \frac{x}{n}\right)^n \\
 \sum_{k=0}^{n-1} ar^k &= a \frac{1-r^n}{1-r} \quad \text{if } r \neq 1 \\
 \sum_{k=0}^{\infty} ar^k &= \frac{a}{1-r} \quad \text{if } |r| < 1 \\
 (x+y)^n &= \sum_{k=0}^n \binom{n}{k} x^k y^{n-k}
 \end{aligned}$$

### Moment generating functions for some common distributions

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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	$L(a)$	$\frac{1}{1-a^2 t^2}$ for $ t  < 1/a$
Normal	$N(\mu, \sigma^2)$	$e^{t\mu + \sigma^2 t^2 / 2}$

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### Some statistical results

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