- X has the normal distribution with mean μ and standard deviation $\sigma > 0$ if the probability density function of X is
$$f_X(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma^2}$$
for all x.

- X has the gamma distribution with parameters $\alpha > 0, \beta > 0$ if the probability density function of X is
$$f_X(x) = \frac{x^{\alpha-1}e^{-x/\beta}}{\beta^\alpha \Gamma(\alpha)}$$
when $x \geq 0$ and 0 otherwise.

- X has the beta distribution with parameters $\alpha > 0, \beta > 0$ if the probability density function of X is
$$f_X(x) = \frac{x^{\alpha-1}(1-x)^{\beta-1}}{B(\alpha, \beta)}$$
when $0 \leq x \leq 1$ and 0 otherwise.
$$B(\alpha, \beta) = \frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha+\beta)}$$

- X has the Poisson distribution with parameter λ if the probability mass function of X is
$$p_X(k) = \frac{\lambda^k e^{-\lambda}}{k!}$$
when $k = 0, 1, 2, \ldots$.

- The moment generating function of a Uniform random variable on the interval $[a, b]$ is
$$\frac{e^{tb} - e^{ta}}{t(b-a)}$$

- The moment generating function of a Normal random variable with mean μ and standard deviation $\sigma > 0$ is
$$e^{\mu t + t^2\sigma^2/2}$$

- The moment generating function of a gamma random variable with parameters $\alpha > 0, \beta > 0$ is
$$(1 - \beta t)^{-\alpha}$$

- The moment generating function of a Binomial random variable with parameters $n > 0, 0 \leq p \leq 1$ is
$$(pe^t - 1 - p)^n$$

- The moment generating function of a Geometric random variable with parameters $0 \leq p \leq 1$ is
$$\frac{pe^t}{1-(1-p)e^t}$$

- The moment generating function of a Poisson random variable with parameters $0 \leq \lambda$ is
$$e^{\lambda(e^t - 1)}$$