- 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. Its mgf is

  $$e^{\mu t + t^2\sigma^2/2}.$$

- 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. Its mgf is

  $$(1 - \beta t)^{-\alpha}.$$

- X has the beta distribution with parameters $\alpha > 0, \beta > 0$ if the probability density function of X is

  $$f_X(x) = \frac{\Gamma(\alpha + \beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1},$$

  when $0 \leq x \leq 1$ and 0 otherwise.

- 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 $k = 0, 1, 2, \ldots$. Its mgf is

  $$e^{\lambda(e^t - 1)}.$$

The exponential distribution is the gamma distribution with parameter $\alpha = 1$, and the uniform distribution is the beta distribution with parameters $\alpha = \beta = 1$.