

Beta distribution: If $X \sim Be(\alpha, \beta)$ then it has density

$$f(x|\alpha, \beta) = \frac{x^{\alpha-1}(1-x)^{\beta-1}}{B(\alpha, \beta)}, \quad 0 < x < 1, \quad \alpha > 0, \beta > 0.$$

Also, $E(X) = \alpha/(\alpha + \beta)$, $Var(X) = \alpha\beta/\{(\alpha + \beta)^2(\alpha + \beta + 1)\}$ and $Mode(X) = (\alpha - 1)/(\alpha + \beta - 2)$. Note also that $B(a, b) = (a - 1)!(b - 1)!/(a + b - 1)!$, $a, b \in \mathbb{Z}$.

Beta-Binomial distribution: If $X \sim BetaBin(n, a, b)$ then it has density

$$f(x|n, a, b) = \binom{n}{x} \frac{B(x + a, b + n - x)}{B(a, b)}, \quad x = 0, 1, \dots, n, \quad n \in \mathbb{Z}_+, a > 0, b > 0.$$

Also, $E(X) = na/(a + b)$ and $Var(X) = nab(a + b + n)/(a + b)^2(a + b + 1)$.

Binomial distribution If $X|\theta \sim Bin(k, \theta)$ then it has probability function

$$f(x|\theta) = \binom{k}{x} \theta^x (1 - \theta)^{k-x}, \quad x = 0, 1, \dots, k, \quad k \in \mathbb{Z}_+, 0 < \theta < 1.$$

Also, $E(X) = k\theta$ and $Var(X) = k\theta(1 - \theta)$.

Exponential distribution: If $X \sim Exp(\lambda)$ then it has density

$$f(x|\lambda) = \lambda e^{-\lambda x}, \quad x > 0, \quad \lambda > 0.$$

Also, $E(X) = 1/\lambda$ and $Var(X) = 1/\lambda^2$.

Gamma distribution: If $X \sim Ga(\alpha, \lambda)$ then it has density

$$f(x|\alpha, \lambda) = \frac{\lambda^\alpha x^{\alpha-1} e^{-\lambda x}}{\Gamma(\alpha)}, \quad x > 0, \quad \alpha > 0, \lambda > 0.$$

Also, $E(X) = \alpha/\lambda$, $Var(X) = \alpha/\lambda^2$ and $Mode(X) = (\alpha - 1)/\lambda$ when $\alpha \geq 1$. Note also that $\Gamma(a) = (a - 1)!$, $a \in \mathbb{Z}$.

Normal distribution: If $X \sim N(\mu, 1/\tau)$ then it has density

$$f(x|\mu, \tau) = \left(\frac{\tau}{2\pi}\right)^{1/2} \exp\left\{-\frac{\tau}{2}(x - \mu)^2\right\}, \quad -\infty < x < \infty, \quad -\infty < \mu < \infty, \tau > 0.$$

Also, $E(X) = \mu$ and $Var(X) = 1/\tau$.

Note: If $X \sim N(0, 1)$ then the following quantiles apply:

x	1.96	2.326	2.366	2.409	2.457	2.484	2.512	2.543	2.576
$\Pr(X < x)$	0.975	0.99	0.991	0.992	0.993	0.9935	0.994	0.9945	0.995

Poisson distribution: If $X \sim Po(\lambda)$ then it has probability function

$$f(x|\lambda) = \frac{\lambda^x e^{-\lambda}}{x!}, \quad x = 0, 1, \dots, \quad \lambda > 0.$$

Also, $E(X) = \lambda$ and $Var(X) = \lambda$.

Continuous Uniform distribution: If $X \sim U(a, b)$, then it has density

$$f(x|a, b) = \frac{1}{b - a}, \quad a < x < b, \quad -\infty < a, b < \infty.$$

Also, $E(X) = (a + b)/2$ and $Var(X) = (b - a)^2/12$.