Distribution	probability mass fcn	Support	Parameters	Expectation	Variance
Bernoulli	$p^{y_i}(1-p)^{1-y_i}$	$y_i = 0, 1$	$0 \le p \le 1$	$E[Y_i] = p$	$\text{Var}[Y_i] = p(1-p)$
Binomial	$\binom{n}{y_i} p^{y_i}(1-p)^{n-y_i}$	$y_i = 0, 1, 2, .., n$	$0 \le p \le 1$	np	$np(1-p)$
Geometric	$p(1-p)^{y_i-1}$	$y_i = 1, 2, ...$	$0 \le p \le 1$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Negative Binomial	$\binom{r+y_i-1}{y_i} p^r(1-p)^{y_i}$	$y_i = 0, 1, 2, ...$	$0 \le p \le 1$	$\frac{r(1-p)}{p}$	$\frac{r(1-p)}{p^2}$
Poisson	$\lambda^{y_i} e^{-\lambda}/y_i!$	$y_i = 0, 1, 2, ...$	$\lambda > 0$	λ	λ

Distribution	density function	Support	Parameters	Mean	Variance
Uniform (a, b)	$\frac{1}{b-a}$	$a \le y_i \le b$	$-\infty < a < b < \infty$	$\frac{b+a}{2}$	$\frac{(b-a)^2}{12}$
Beta(α,β)	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} y_i^{\alpha-1}(1-y_i)^{\beta-1}$	$0 < y_i < 1$	$\alpha > 0, \beta > 0$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$
Normal(μ, σ^2)	$\frac{1}{\sqrt{2\pi\sigma^2}} \exp\left[\frac{-(y_i-\mu)^2}{2\sigma^2}\right]$	$-\infty < y_i < \infty$	$-\infty < \mu < \infty$	μ	σ^2
Exponential(β)	$\frac{1}{\beta} \exp(\frac{-y_i}{\beta})$	$y_i \ge 0$	$\beta > 0$	β	β^2
Gamma(α, β)	$\frac{1}{\beta^\alpha \Gamma(\alpha)} y_i^{\alpha-1} \exp(\frac{-y_i}{\beta})$	$y_i \ge 0$	$\alpha > 0, \beta > 0$	$\alpha\beta$	$\alpha\beta^2$
Chi-squared(p) $\equiv \chi^2_p$	$\frac{1}{2^{\frac{p}{2}}\Gamma(\frac{p}{2})} y_i^{p/2-1} \exp(\frac{-y_i}{2})$	$y_i \ge 0$	$p = 1, 2, ...$	p	$2p$
Inverse Gamma(α, β)	$\frac{1}{\beta^\alpha \Gamma(\alpha)} y_i^{-(\alpha+1)} \exp(\frac{-1}{y_i\beta})$	$y_i \ge 0$	$\alpha > 0, \beta > 0$	$\frac{1}{(\alpha-1)\beta}$	$\frac{1}{(\alpha-1)^2(\alpha-2)\beta^2}$
Inverse chi-square(p, q)	$\frac{(\frac{q}{2})^{\frac{p}{2}}}{\Gamma(\frac{p}{2})} y_i^{-(\frac{p}{2}+1)} \exp\left(\frac{-q}{2y_i}\right)$	$y_i \ge 0$	$p > 0, q > 0$	$\frac{q}{p-2}$	$\frac{2q^2}{(p-2)^2(p-4)}$
Pareto (α, β)	$\frac{\beta\alpha^\beta}{y_i^{\beta+1}}$	$y_i > \alpha$	$\alpha > 0, \beta > 0$	$\frac{\beta\alpha}{\beta-1}$	$\frac{\beta\alpha^2}{(\beta-1)^2(\beta-2)}$
Weibull (γ, β)	$\frac{\gamma}{\beta} y_i^{\gamma-1} \exp(\frac{-y_i^\gamma}{\beta})$	$y_i \ge 0$	$\gamma > 0, \beta > 0$	$\beta^{\frac{1}{\gamma}}\Gamma(1+\frac{1}{\gamma})$	$\beta^{\frac{2}{\gamma}} \times \left[\Gamma(1+\frac{2}{\gamma}) - \Gamma^2(1+\frac{1}{\gamma})\right]$
$t_p(m, w)$	$\frac{1}{\sqrt{\pi w p}} \frac{\Gamma((p+1)/2)}{\Gamma(p/2)} \times [1 + \frac{(y_i-m)^2}{pw}]^{-(p+1)/2}$	$-\infty < y_i < \infty,$	$p = 1, 2, ...$	m	$\frac{wp}{p-2}$

i) $(\mu, \tau) \sim \text{NIC}(p, q, m, v) :\ E[\mu] = m,\ Var[\mu] = \frac{qv}{p-2},\ E[\tau] = \frac{q}{p-2},\ Var[\tau] = \frac{2q^2}{(p-2)^2(p-4)}$

$$f(\mu, \tau : p, q, m, v) = \frac{(q/2)^{\frac{p}{2}}}{\sqrt{2\pi v}\Gamma(\frac{p}{2})} \tau^{-(p+3)/2} \exp\left(-\frac{1}{2\tau}\{v^{-1}(\mu-m)^2 + q\}\right) \quad \tau > 0, -\infty < \mu < \infty$$

ii) $(\theta_1, ..., \theta_k) \sim$ Dirichlet $(\alpha_1, ..., \alpha_k)$ $\ E[\theta_j] = \frac{\alpha_j}{\alpha_0}\ $ $\text{Var}[\theta_j] = \frac{\alpha_j(\alpha_0-\alpha_j)}{\alpha_0^2(\alpha_0+1)}\ $ $\text{Cov}[\theta_i, \theta_j] = \frac{-\alpha_i\alpha_j}{\alpha_0^2(\alpha_0+1)}$

$$p(\boldsymbol{\theta}) = \frac{\Gamma(\alpha_1 + ... + \alpha_k)}{\Gamma(\alpha_1)\cdots\Gamma(\alpha_k)} \theta_1^{\alpha_1-1} \cdots \theta_k^{\alpha_k-1}, \quad \text{where } \sum_{j=1}^k \theta_j = 1 \quad \alpha_0 = \sum_{j=1}^k \alpha_j$$