| Name | Notation | pdf/pmf | Range | Mean $\mu$ | Variance $\sigma^2$ | |
|---|---|---|---|---|---|---|
| **Beta** | $\mathsf{Be}(\alpha, \beta)$ | $f(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1}$ | $x \in (0,1)$ | $\frac{\alpha}{\alpha+\beta}$ | $\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$ | |
| **Binomial** | $\mathsf{Bi}(n, p)$ | $f(x) = \binom{n}{x} p^x q^{(n-x)}$ | $x \in 0, \cdots, n$ | $n\,p$ | $n\,p\,q$ | $(q = 1-p)$ |
| **Exponential** | $\mathsf{Ex}(\lambda)$ | $f(x) = \lambda\, e^{-\lambda x}$ | $x \in \mathbb{R}_+$ | $1/\lambda$ | $1/\lambda^2$ | |
| **Gamma** | $\mathsf{Ga}(\alpha, \lambda)$ | $f(x) = \frac{\lambda^\alpha}{\Gamma(\alpha)} x^{\alpha-1}\, e^{-\lambda x}$ | $x \in \mathbb{R}_+$ | $\alpha/\lambda$ | $\alpha/\lambda^2$ | |
| **Geometric** | $\mathsf{Ge}(p)$ | $f(x) = p\, q^x$ | $x \in \mathbb{Z}_+$ | $q/p$ | $q/p^2$ | $(q = 1-p)$ |
| **HyperGeometric** | $\mathsf{HG}(n, A, B)$ | $f(x) = \frac{\binom{A}{x}\binom{B}{n-x}}{\binom{A+B}{n}}$ | $x \in 0, \cdots, n$ | $n\,P$ | $n\,P\,Q \frac{N-n}{N-1}$ | $(P = \frac{A}{A+B}, Q = \frac{B}{A+B}$ |
| **Logistic** | $\mathsf{Lo}(\mu, \beta)$ | $f(x) = \frac{e^{-(x-\mu)/\beta}}{\beta[1+e^{-(x-\mu)/\beta}]^2}$ | $x \in \mathbb{R}$ | $\mu$ | $\pi^2\beta^2/3$ | |
| **Log Normal** | $\mathsf{LN}(\mu, \sigma^2)$ | $f(x) = \frac{1}{x\sqrt{2\pi\sigma^2}} e^{-(\log x-\mu)^2/2\sigma^2}$ | $x \in \mathbb{R}_+$ | $e^{\mu+\sigma^2/2}$ | $e^{2\mu+\sigma^2}\left(e^{\sigma^2}-1\right)$ | |
| **Negative Binomial** | $\mathsf{NB}(\alpha, p)$ | $f(x) = \binom{-\alpha}{x} p^\alpha\,(-q)^x$ | $x \in \mathbb{Z}_+$ | $\alpha q/p$ | $\alpha q/p^2$ | $(q = 1-p)$ |
| **Normal** | $\mathsf{No}(\mu, \sigma^2)$ | $f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(x-\mu)^2/2\sigma^2}$ | $x \in \mathbb{R}$ | $\mu$ | $\sigma^2$ | |
| **Pareto** | $\mathsf{Pa}(\alpha, \beta)$ | $f(x) = \beta\,\alpha^\beta / x^{\beta+1}$ | $x \in (\alpha, \infty)$ | $\frac{\alpha\,\beta}{\beta-1}$ | $\frac{\alpha^2\beta}{(\beta-1)^2(\beta-2)}$ | |
| **Poisson** | $\mathsf{Po}(\lambda)$ | $f(x) = \frac{\lambda^x}{x!} e^{-\lambda}$ | $x \in \mathbb{Z}_+$ | $\lambda$ | $\lambda$ | |
| **Snedecor** $F$ | $F(\nu_1, \nu_2)$ | $f(x) = \frac{\Gamma(\frac{\nu_1+\nu_2}{2})(\nu_1/\nu_2)^{\nu_1/2}}{\Gamma(\frac{\nu_1}{2})\Gamma(\frac{\nu_2}{2})} \times x^{\frac{\nu_1-2}{2}} \left[1 + \frac{\nu_1}{\nu_2}\,x\right]^{-\frac{\nu_1+\nu_2}{2}}$ | $x \in \mathbb{R}_+$ | $\frac{\nu_2}{\nu_2-2}$ | $\left(\frac{\nu_2}{\nu_2-2}\right)^2 \frac{2(\nu_1+\nu_2-2)}{\nu_1(\nu_2-4)}$ | |
| **Student** $t$ | $t(\nu)$ | $f(x) = \frac{\Gamma(\frac{\nu+1}{2})}{\Gamma(\frac{\nu}{2})\sqrt{\pi\nu}}[1 + x^2/\nu]^{-(\nu+1)/2}$ | $x \in \mathbb{R}$ | $0$ | $\nu/(\nu-2)$ | |
| **Uniform** | $\mathsf{Un}(\alpha, \beta)$ | $f(x) = \frac{1}{\beta-\alpha}$ | $x \in (\alpha, \beta)$ | $\frac{\alpha+\beta}{2}$ | $\frac{(\beta-\alpha)^2}{12}$ | |