

Common probability distributions

Distribution	Notation	pdf/pmf	Variable	Parameters	Mean	Variance
Bernoulli	$Ber(p)$	$p^x(1-p)^{1-x}$	$x = 0 \text{ or } 1$	$0 < p < 1$	p	$p(1-p)$
Binomial	$Bin(n, p)$	$\binom{n}{x} p^x (1-p)^{n-x}$	$x = 0, 1, \dots, n$	$0 < p < 1$	np	$np(1-p)$
Poisson	$Poi(\mu)$	$e^{-\mu} \frac{\mu^x}{x!}$	$x = 0, 1, 2, \dots$	$\mu > 0$	μ	μ
Normal	$N(\mu, \sigma^2)$	$\frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	$-\infty < x < \infty$	$-\infty < \mu < \infty, \sigma > 0$	μ	σ^2
Exponential	$Ex(\lambda)$	$\lambda e^{-\lambda x}$	$x > 0$	$\lambda > 0$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Uniform	$Unif(a, b)$	$\frac{1}{b-a}$	$a \leq x \leq b$	$-\infty < a < b < \infty$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Beta	$Be(a, b)$	$\frac{1}{B(a, b)} x^{a-1} (1-x)^{b-1}$	$0 < x < 1$	$a > 0, b > 0$	$\frac{a}{a+b}$	$\frac{ab}{(a+b)^2(a+b+1)}$
Gamma	$Ga(a, b)$	$\frac{b^a}{\Gamma(a)} x^{a-1} e^{-bx}$	$x > 0$	$a > 0, b > 0$	$\frac{a}{b}$	$\frac{a}{b^2}$
Pareto	$Pa(a, b)$	$\frac{ab^a}{x^{a+1}}$	$x > b$	$a > 0, b > 0$ if $a > 1$	$\frac{ab}{a-1}$ if $a > 2$	$\frac{ab^2}{(a-1)^2(a-2)}$