Continuous Distributions

Distribution	Probability Density Function (PDF)	Expected Value	Variance
Continuous Random Variable (x)	$f(x)$	$E(x) = \int x \cdot f(x)dx$	$V(x) = \int [x^2 \cdot f(x) - [E(x)]^2]dx$
Uniform U[a, b]	$f(x) = \frac{1}{b-a}$ $a \leq x \leq b$	$E(x) = \frac{a+b}{2}$	$\sigma^2 = \frac{(b-a)^2}{12}$
Normal (x) N[μ, σ]	$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ $-\infty < x < \infty$	$E(x) = \mu$	$V(x) = \sigma^2$
Standard Normal (z) N[μ = 0, σ = 1]	$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$ $-\infty < z < \infty$	$E(z) = 0$	$V(z) = 1$
Triangle (a, m, b)	$f(x) = \begin{cases} \frac{2(x-a)}{(m-a)(b-a)} & for\ a \leq x \leq m \\ \frac{2(b-x)}{(b-m)(b-a)} & for\ m < x \leq b \end{cases}$	$E(x) = \frac{a+m+b}{3}$	$\sigma^2 = \frac{a^2+m^2+b^2-am-ab-mb}{18}$
Rectangular (a, b)	$f(x) = \frac{1}{b-a}$	$E(x) = \frac{a+b}{2}$	$V(x) = \frac{(b-a)^2}{12}$
Exponential(β)	$f(x) = \frac{1}{\beta} e^{-\frac{x}{\beta}}$ $0 \leq x < \infty$	$E(x) = \beta$	$V(x) = \beta^2$
Erlang(k, λ)	$f(x) = \frac{\lambda^k x^{k-1} e^{-\lambda x}}{(k-1)!}$ $0 \leq x < \infty$	$E(x) = \frac{k}{\lambda}$	$V(x) = \frac{k}{\lambda^2}$
Logistic(μ, β)	$f(x) = \frac{e^{-\left(\frac{x-\mu}{\beta}\right)}}{\beta\left[1 + e^{-\left(\frac{x-\mu}{\beta}\right)}\right]^2}$ $-\infty < x < \infty$	$E(x) = \mu$	$V(x) = \frac{\pi^2\beta^2}{3}$
Standard Logistic(μ, β) (μ = 0, β = 1)	$f(x) = \frac{e^{-x}}{[1+e^{-x}]^2}$ $-\infty < x < \infty$	$E(x) = 0$	$V(x) = \frac{\pi^2}{3}$
$\boldsymbol{\Gamma(\alpha) = \int_0^\infty x^{\alpha-1} e^{-x} dx}$			
Gamma(α, β)	$f(x) = \frac{x^{\alpha-1} e^{-\frac{x}{\beta}}}{\Gamma(\alpha)\beta^\alpha}$ $0 \leq x < \infty$	$E(x) = \alpha\beta$	$V(x) = \alpha\beta^2$
Chi − square $\chi^2(\nu)$ $(\alpha = \frac{\nu}{2}, \beta = 2)$	$f(x) = \frac{x^{\frac{\nu}{2}-1} e^{-\frac{\nu}{2}}}{\Gamma(\frac{\nu}{2}) 2^{\frac{\nu}{2}}}$ $0 \leq x < \infty$	$E(x) = \nu$	$V(x) = 2\nu$
Weibull(α, β)	$f(x) = \alpha\beta^{-\alpha} x^{\alpha-1} e^{-\left(\frac{x}{\beta}\right)^\alpha}$ $0 \leq x < \infty$	$E(x) = \beta\Gamma(1 + \frac{1}{\alpha})$	$V(x) = \beta^2\Gamma\left(1 + \frac{2}{\alpha}\right) - \left[\beta\Gamma(1 + \frac{1}{\alpha})\right]^2$
Beta(α, β)	$f(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1}$ $0 \leq x \leq 1$	$E(x) = \frac{\alpha}{\alpha+\beta}$	$V(x) = \frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$
Student's t − distribution	$f(x) = \frac{\Gamma\left(\frac{\nu+1}{2}\right)\left(1 + \frac{x^2}{\nu}\right)^{-\frac{\nu+1}{2}}}{\sqrt{\nu\pi}\Gamma(\frac{\nu}{2})}$ $-\infty < x < \infty$	$E(x) = 0$	$V(x) = \frac{\nu}{\nu-2},\ \nu > 2$