Some Common Continous Random Variables

Normal	Exponential	Uniform
$X \sim N(\mu, \sigma^2)$	$X \sim Exp(\lambda)$	$X \sim U(a, b)$
$x \in [-\infty, \infty]$	$x \in [0, \infty]$	$x \in [a, b]$
$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$	$f(x) = \lambda e^{-\lambda x}$	$f(x) = \frac{1}{b-a}$
$E(X) = \mu$	$E(X) = \frac{1}{\lambda}$	$E(X) = \frac{a+b}{2}$
$Var(X) = \sigma^2$	$Var(X) = \frac{1}{\lambda^2}$	$Var(X) = \frac{(b-a)^2}{12}$
$\phi_X(\omega) = e^{j\mu\omega - \frac{\sigma^2\omega^2}{2}}$	$\phi_X(\omega) = \frac{\lambda}{\lambda - j\omega}$	$\phi_X(\omega) = \frac{e^{j\omega b} - e^{j\omega a}}{j\omega(b-a)}$

Erlang	Chi Squared
$X \sim Erlang(\lambda, k)$	$X \sim \chi^2(k)$
$x \in [0, \infty]$	$x \in [0, \infty]$
$f(x) = \frac{\lambda^k}{(k-1)!} x^{k-1} e^{-\lambda x}$	$f(x) = \frac{1}{2^{k/2}\Gamma(k/2)} x^{k/2-1} e^{-x/2}$
$E(X) = \frac{k}{\lambda}$	$E(X) = k$
$Var(X) = \frac{k}{\lambda^2}$	$Var(X) = 2k$
$\phi_X(\omega) = \left(\frac{\lambda}{\lambda - j\omega}\right)^k$	$\phi_X(\omega) = \left(\frac{1}{1 - j2\omega}\right)^{k/2}$

Laplacian Random Variable
$X \sim Lap(\alpha)$
$x \in [-\infty, \infty]$
$f(x) = \frac{\alpha}{2} e^{-\alpha\lvert x\rvert}$
$E(X) = 0$
$Var(X) = \frac{2}{\alpha^2}$
$\phi_X(\omega) = \frac{\alpha^2}{\alpha^2 + \omega^2}$

The Erlang distribution is the sum of k independent exponential random variables with rate λ. The Chi Squared distribution is the sum of the squares of k independent standard normal random variables.