Common Continuous Probability Distributions

Distribution of *rv* Y	**Probability Density Function**	**Mean** $E(Y)$	**Variance** $V(Y)$	*mgf* $m_Y(t)$
Uniform	$f_Y(y) = \frac{1}{\theta_2 - \theta_1}, \ \theta_1 < y < \theta_2$	$\frac{\theta_1 + \theta_2}{2}$	$\frac{(\theta_2 - \theta_1)^2}{12}$	$\frac{e^{t\theta_2} - e^{t\theta_1}}{t(\theta_2 - \theta_1)}$
Normal	$f_Y(y) = \frac{1}{\sigma\sqrt{2\pi}} exp[-(\frac{1}{2\sigma^2})(y-\mu)^2]$, $-\infty < y < +\infty, \ -\infty < \mu < +\infty, \ \sigma^2 > 0$	μ	σ^2	$\exp\left(\mu t + \frac{t^2\sigma^2}{2}\right)$
Exponential	$f_Y(y) = \frac{1}{\beta} e^{-y/\beta}, \ 0 < y < +\infty,$ $\beta > 0$	β	β^2	$(1-\beta t)^{-1}$
Gamma	$f_Y(y) = \left[\frac{1}{\Gamma(\alpha)\beta^\alpha}\right] y^{\alpha-1} e^{-y/\beta},$ $0 < y < +\infty, \ \alpha > 0, \ \beta > 0$	$\alpha\beta$	$\alpha\beta^2$	$(1-\beta t)^{-\alpha}$
Chi-square	$f_Y(y) = \frac{y^{(\nu/2)-1} e^{-y/2}}{2^{\nu/2}\Gamma(\nu/2)},$ $0 < y < +\infty, \ \nu > 0$	ν	2ν	$(1-2t)^{-\nu/2}$
Beta	$f_Y(y) = \left[\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}\right] y^{\alpha-1}(1-y)^{\beta-1},$ $0 < y < 1, \ \alpha > 0, \ \beta > 0$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$	Closed form for m_Y(t) does not exist.