Continuous random variable cheat sheet

Uniform random variable $U_{a,b}$ on $[a,b]$:

Density:

$$f(x) = \begin{cases} \dfrac{1}{b-a} & \text{for } a < x < b \\ 0 & \text{else.} \end{cases}$$

Expectation:

$$E(U_{a,b}) = \frac{a+b}{2}.$$

Variance:

$$var(U_{a,b}) = \frac{(b-a)^2}{12}.$$

Normal random variable $Z_{\mu,\sigma}$: Density:

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/(2\sigma^2)}$$

Expectation is μ, standard deviation is σ. Standard normal variable: $Z = Z_{0,1}$.

Exponential random variable Y_λ: Density:

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{for } x \geq 0 \\ 0 & \text{for } x < 0. \end{cases}$$

Expectation: $E(Y_\lambda) = 1/\lambda$. Variance: $var(Y_\lambda) = 1/\lambda^2$.

Gamma random variable $\Gamma_{\lambda,\alpha}$: Density:

$$f(x) = \begin{cases} \lambda e^{-\lambda x}(\lambda x)^{\alpha-1}/\Gamma(\alpha) & \text{for } x \geq 0 \\ 0 & \text{for } x < 0. \end{cases}$$

Expectation: $E(\Gamma_{\lambda,\alpha}) = \alpha/\lambda$. Variance: $var(\Gamma_{\lambda,\alpha}) = \alpha/\lambda^2$.

The Gamma function:

$$\Gamma(\alpha) = \int_0^\infty e^{-x} x^{\alpha-1} dx.$$

For n a positive integer:

$$\Gamma(n) = (n-1)!.$$

$$\Gamma(1/2) = \sqrt{\pi}.$$