# Expected value and variable of a Beta random variable

In general: $E(X) = \frac{\alpha}{\alpha+\beta}$ $\quad Var(X) = \frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$

Do not need to derive these in the general case.

We focus on specific $\alpha$ and $\beta$ values, and when we fix specific $\alpha$ and $\beta$ then we can derive the expected value and variance.

Notice: $f_X(x) = \begin{cases} \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1} & \text{for } x \in [0,1] \\ 0 & \text{otherwise} \end{cases}$

This $\Gamma$ function is just a factorial of the input minus 1, when the input is an integer. i.e. $\Gamma(n) = (n-1)!$ for integers $n$.

$\Gamma(5) = 4!$, $\Gamma(8) = 7!$, etc.