The density of a Beta random variable is proportional to \( x^{\alpha-1} (1-x)^{\beta-1} \) for \( 0 < x < 1 \) and \( \alpha, \beta \) some fixed parameters.

\[
f_X(x) = \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1} \text{ for } 0 < x < 1
\]

\( = 0 \) otherwise

Idea: The beta random variable models the behavior of some proportion (\( X \) is the proportion; notice \( 0 < X < 1 \)), based on the prior observations related to the random variable. Based on these, we set (and fix) \( \alpha \) and \( \beta \) to model future of the random variable \( X \).