

STAT/MA 41600
In-Class Problem Set #34: November 4, 2016

1. Consider a Beta random variable X with parameters $\alpha = 3$ and $\beta = 2$.
 - 1a. Is it more likely that X is smaller than $1/2$ or larger than $1/2$?
 - 1b. Verify directly, *without using the general formula* $\mathbb{E}(X) = \alpha/(\alpha + \beta)$, that the expected value of X is $\mathbb{E}(X) = 3/5$.
2. Same setup as question #1.
 - 2a. Find $P(X > 1/2 \mid X > 1/4)$. [Hint: You can use your work from 1a to help with 2a.]
 - 2b. Find the probability that the distance between X and $1/2$ is at least $2/5$, i.e., find $P(|X - 1/2| > 2/5)$.
3. Same setup as question #1. If U is a continuous uniform random variable on $(0, 1)$ and U is independent from X , find $P(U < X)$.
4. Review question: Roll a die until the first 5 appears. Let X denote the number of rolls needed (including the 5 itself). Find the probability that X is an even number.