

STAT/MA 41600
In-Class Problem Set #16: September 23, 2016

- 1.** Rhonda rolls a fair 6-sided die until the first occurrence of “2”, and then she stops afterwards. Bernadette rolls a 4-sided die until the first occurrence of “2”, and then she stops afterwards.
 - 1a.** Consider the number of Rhonda’s rolls minus the number of Bernadette’s rolls. What is the variance?
 - 1b.** What is the probability that the number of Rhonda’s rolls is the same as the number of Bernadette’s rolls?
- 2.** In the previous question, what is the probability that the number of Rhonda’s rolls *strictly exceeds* the number of Bernadette’s rolls?
- 3.** Suppose that X and Y are two independent geometric random variables with $\mathbb{E}(X) = 4$ and $\mathbb{E}(Y) = 5$.
 - 3a.** What is $\mathbb{E}(X - Y)$?
 - 3b.** What is $\text{Var}(X - Y)$?
- 4.** Reconsider the random variables from question **3**.
 - 4a.** Find $P(X > 7 \mid X > 5)$.
 - 4b.** Find $P(X > 7 \mid X > Y)$.