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 $\mathrm{Var}\,(X - Y)$?

4. Reconsider the random variables from question **3**.
4a. Find $P(X > 7 \mid X > 5)$.
4b. Find $P(X > 7 \mid X > Y)$.