STAT/MA 41600
In-Class Problem Set #16: September 25, 2015

1. Suppose X and Y are independent Geometric random variables, with $\mathbb{E}(X) = 4$ and $\mathbb{E}(Y) = 3/2$.

1a. Find the probability that X and Y are equal, i.e., find $P(X = Y)$.

1b. Find the probability that X is strictly larger than Y, i.e., find $P(X > Y)$. [Hint: Unlike in the previous problem set, we do *not* have symmetry between X and Y today, so you must calculate.]

2. Suppose X and Y are independent Geometric random variables, each with expected value $5/4$.

2a. Find the probability that $X + Y = 5$.

2b. What is the variance of $2Y - 3X$?

3. Let X be a Geometric random variable with $\mathbb{E}(X) = 3$. Let A denote the event that X is even, i.e., is a multiple of 2.

3a. Find $P(A)$.

3b. Let B denote the event that X is a multiple of 4. Are A and B independent events?

4. Let X, Y, and Z be independent Geometric random variables that each have expected value $5/3$.

4a. Find $P(X > 10)$.

4b. Find $P(X + Y > 10)$.

4c. Find $P(X + Y + Z > 10)$.