STAT/MA 41600

In-Class Problem Set #11: September 15, 2017

**1.** Roll a 4-sided die and a 6-sided die. Let $X$ denote the sum. Define two random variables so that $X = X_1 + X_2$. (These two random variables will not be indicator random variables.) Then calculate the expected value of $X$ as the sum of the expected values of these two random variables.

**2.** Flip 5 fair coins. Let $X$ denote the number of heads that appear. Define some indicator random variables $X_1, \ldots, X_5$ so that $X = X_1 + \cdots + X_5$. Then use the random variables you created to find $\mathbb{E}(X)$.

**3a.** Suppose we draw 5 cards at random, without replacement, from a deck of 52 cards (such a deck includes 4 Queens). Let $X$ denote the number of Queens drawn. Define some indicator random variables $X_1, \ldots, X_5$ so that $X = X_1 + \cdots + X_5$. Then use the random variables you created to find $\mathbb{E}(X)$.
**3b.** Same question, but this time draw the 5 cards one at a time, with replacement (and shuffling) between cards.

**4.** A family with three daughters and three sons needs to go to the grocery store. Besides the father, who is driving the car, exactly three of the children can come along to the grocery store with him. Suppose that the three children to join the father are chosen randomly, and all such choices are equally likely.

Let $X$ denote the number of daughters who accompany the father to the grocery. Define some indicator random variables $X_1, X_2, X_3$ so that $X = X_1 + X_2 + X_3$. Then use the random variables you created to find $\mathbb{E}(X)$.