STAT/MA 41600
In-Class Problem Set #10: September 14, 2016

1. Consider a collection of 6 bears. There is a pair of red bears consisting of one father bear and one mother bear. There is a similar green bear pair, and a similar blue bear pair. A bear pair is happy if it is sitting together. Let X denote the number of happy bear pairs. Find $\mathbb{E}(X)$. (See Problem Set #7, question 4.)

2a. Pick two cards simultaneously at random from a well-shuffled deck of 52 cards. There are 36 cards which have numbers on them (cards 2 through 10, in each of the 4 suits), and there are 16 cards without numbers on them (A, J, Q, K, in each of the 4 suits). Let X be the number of cards that you get with numbers on them. Find $\mathbb{E}(X)$. (See Problem Set #7, question 3.)

2b. Reconsider question **2a**, but this time pick 3 cards. Find $p_X(x)$ for $0 \leq x \leq 3$, and $\mathbb{E}(X)$.

3a. Consider a deck of 5 cards with the values A, 2, 3, 4, 5. We deal one card at a time from this deck of 5 cards, with replacement of the card back into the deck—and also shuffling—in between each deal. We continue in this fashion until the first A appears, and then we stop afterwards. Let X be the number of cards dealt. Find $\mathbb{E}(X)$.
3b. Reconsider question **3a**, but this time do not replace the cards after they are dealt. Find $p_X(x)$ for $1 \leq x \leq 5$, and $\mathbb{E}(X)$.

4. Suppose Alice rolls a 6-sided die, and Bob rolls a 4-sided die. Let X denote the *maximum* value on the two dice.
4a. Find $p_X(x)$ for $1 \leq x \leq 6$.
4b. Find $\mathbb{E}(X)$.