STAT/MA 41600
In-Class Problem Set #7: September 9, 2015

1. Roll three (6-sided) dice. Let X denote the maximum of the values that appear.
1a. Find $P(X = 1)$. **1b.** Find $P(X = 2)$. **1c.** Find $P(X = 3)$.
1d. Find $P(X = 4)$. **1e.** Find $P(X = 5)$. **1f.** Find $P(X = 6)$.
[Hint: It might be helpful to first find the values of $P(X \leq x)$.]

2. Consider a collection of 9 bears. There is a family of red bears consisting of one father bear, one mother bear, and one baby bear. There is a similar green bear family, and a similar blue bear family. We draw 3 consecutive times from this collection *without replacement* (i.e., not returning the bear after each draw). Let X denote the number of red bears that are chosen.

[Hint: This problem is very similar to Problem Set 2, question 1b, but we are choosing 3 bears in this question, instead of 5 bears.]
2a. Find $P(X = 0)$. **2b.** Find $P(X = 1)$. **2c.** Find $P(X = 2)$. **2d.** Find $P(X = 3)$.

3. Roll a 6-sided die until the first value of "3" that appears, and then stop afterwards. Let X denote the number of rolls that are needed.
3a. Give a formula for $P(X > x)$, where x is a nonnegative integer.
3b. Give a formula for $P(X = x)$, where x is a positive integer.
3c. Verify that the probabilities in **(3b)** have a sum of 1.

4. Suppose that a drawer contains 8 marbles: 2 are red, 2 are blue, 2 are green, and 2 are yellow. The marbles are rolling around in a drawer, so that all possibilities are equally likely when they are drawn. Alice selects marbles (without replacement) until she gets a red marble, and then she stops afterwards. Let X denote the number of draws that are needed until the first red appears.
4a. Find $P(X = 1)$. **4b.** Find $P(X = 2)$. **4c.** Find $P(X = 3)$. **4d.** Find $P(X = 4)$.
4e. Find $P(X = 5)$. **4f.** Find $P(X = 6)$. **4g.** Find $P(X = 7)$.