STAT/MA 41600
In-Class Problem Set #8: September 11, 2015

1. Suppose that 60% of people in Chicago are fans of da Bears. Assume that the fans' preferences are independent. We interview 3 fans, and we let X denote the number of fans of da Bears.

1a. Find the probability mass function of X.

1b. Draw a (fairly accurate) plot of the cumulative distribution function of 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: We computed the probability mass function on Wednesday, during class.]

Draw a (fairly accurate) plot of the cumulative distribution function of X.

3. Roll a 6-sided die until the second value of "3" appears, and then stop afterwards. Let X denote the number of rolls that are needed. Give a formula for the probability mass function of X.

4. Suppose that X has probability mass function $p_X(x) = (\frac{2}{7})(\frac{5}{7})^{x-1}$ for integers $x \geq 1$.

4a. Find $P(3 \leq X \leq 5)$.

4b. Find a simplified formula for $P(a \leq X \leq b)$, where $1 \leq a \leq b$.

(You will not need to use $\sum$ in your answer to 4b.)

Hint: For question 4b, you might want to go back to Problem Set 1, question 4f.

4c. Check that your answer to question 4a agrees with the formula in your solution to question 4b, if you plug in $a = 3$ and $b = 5$.