

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 $b = 5$.