

STAT/MA 41600
In-Class Problem Set #8: September 12, 2014

- 1.** Suppose that we choose cards from a standard 52-card deck, with replacement and shuffling in between cards, until the first card with value 6, 7, 8, 9, or 10 appears, and then we stop. Let X be the number of flips needed. Find $F_X(x)$, the CDF of X , for integers $x \geq 1$.
- 2a.** Roll a die until the first 5 appears. Let X denote the number of rolls needed. Find the probability that X is even.
- 2b.** Suppose that $P(Y = y) = pq^{y-1}$ for integers $y \geq 1$, where $q = 1 - p$. Find the probability that Y is even.
- 3a.** Roll a die until the first 5 appears. Let X denote the number of rolls needed. Find the probability that X is a multiple of 3.
- 3b.** Suppose that $P(Y = y) = pq^{y-1}$ for integers $y \geq 1$, where $q = 1 - p$. Find the probability that Y is a multiple of 3.
- 4.** Suppose Alice flips 4 coins and Bob flips 4 coins. Find the probability that Alice and Bob get the exact same number of heads.
- 5.** 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. Suppose that a person removes marbles from the drawer, one at a time, without replacement, and she stops when red is selected for the first time. Let X denote the number of marbles removed, until red is selected for the first time. Find the probability mass function of X .
- 6.** Suppose that there are 4 red plates and 4 blue plates on a shelf. You randomly select 4 of them, with all choices equally likely. Let X denote the number of blue plates selected. Find $F_X(x)$, the CDF of X , for $x = 0, 1, 2, 3, 4$.