

STAT/MA 41600
In-Class Problem Set #9: September 10, 2018

1. Bob has a die with 1 side painted blue and 3 sides painted white. He rolls it until the blue side is selected, and then he stops afterward. Let X denote the number of times that Bob rolls the die.

Cynthia draws cards from a deck (*with replacement*) until the first Ace appears, and then she stops afterward. Let Y denote the number of times that Cynthia draws from the deck.

What is the probability that Y is greater than or equal to X ?

2. Roll a 4-sided die (tetrahedron), a 6-sided die (cube), and an 8-sided die (octahedron). What is the probability that the 4-sided die has a strictly larger outcome than each of the other two dice?

3. Roll a 4-sided die and a 6-sided die. Let X denote the difference in the values. Find the probability mass function $p_X(x)$, for $x = 0, 1, 2, 3, 4, 5$.

4. Suppose that X and Y are random variables with joint probability mass function $p_{X,Y}(x, y) = (11/16)(1/4)^{x-1}(1/3)^{y-1}$ for integers $1 \leq y \leq x$.

4a. Find $P(X > 4 \mid Y = 1)$.

4b. Are X and Y dependent or independent?

4c. Find the probability mass function of Y .