STAT/MA 41600
In-Class Problem Set #7: September 6, 2017

1. Let X denote the number of raindrops that fall on a window ledge during the next one minute. Let Y be the time until the first of these raindrops falls. Is X a discrete or a continuous random variable? Is Y a discrete or a continuous random variable?

2. Consider a white 4-sided die (numbered 1, 2, 3, 4), and a black 6-sided die (1 to 6). Let X denote the difference in their values. Find $P(X = 0)$, $P(X = 1)$, $P(X = 2)$, $P(X = 3)$, $P(X = 4)$, $P(X = 5)$. Note: These probabilities ought to add up to 1.

3. Roll a 6-sided die until the first occurrence of the value "3" and then stop afterwards. Let X denote the numbers of rolls required.
3a. Find $P(X = 1)$, $P(X = 2)$, $P(X = 3)$, $P(X = 4)$.
3b. Find $P(X > 4)$.
3c. If n is a positive integer, find $P(X > n)$.
3d. Is there any outcome for which it does not make sense for X to have a finite value? What is the probability of such an outcome?

4. Alice rolls a die. Whatever value she gets, Bob tosses that many fair coins. (For example, if Alice rolls a "5", then Bob tosses 5 fair coins.) Let X denote the number of heads that Bob has. Find $P(X = 0)$, $P(X = 1)$, $P(X = 2)$, $P(X = 3)$, $P(X = 4)$, $P(X = 5)$, $P(X = 6)$. Note: These probabilities ought to add up to 1.