STAT 509 2017 Summer HW4
Instructor: Shiwen Shen
Lecture Day: May 11

1. Answer following questions about the random experiment: toss 3 dice:

   (a) What is size of the sample space of the random experiment?

   (b) Define random variable $X =$ sum of the numbers. What is the range of X?

   (c) Define random variable $Y =$ sum of the odd numbers. What is the range of Y?

   (d) Define random variable $Z =$ proportion of getting 5. What is the range of Z?

   In conclusion, for the one random experiment, we have different range coming from different random variable (depending on what our interest is)!

2. What is the probability mass function (pmf) of the random variable Z in problem 1(d)? Try to plot the pmf using R. (Reference R code in notes chapter 3 page 13.)

3. What is the cumulative distribution function (cdf) of the random variable Z in problem 1(d)? Try to plot the cdf using R. (Reference R code in notes chapter 3 page 13.)

4. The range of the random variable X is $\{0, 1, 2, 3, a\}$, in which a is unknown. If each outcome is equally likely and the mean(expectation) of X is 3, what is the value of a?

5. Suppose that the random variable X has the pmf

$$p_Y(y) = \frac{1}{12}(c - 2y)$$

   with range $\{0, 1, 2\}$.

   (a) Find the value of c.

   (b) Compute the expectation and variance of Y.

6. A pencil company has four extruders for making pencil lead. The maintenance manager has determined from historical data that the number of extruders to go down (out of operation) on any given day is as follows: 0 extruder, 50%; 1 extruder, 30%; 2 extruders, 10%; 3 extruders, 5%; 4 extruders, 5%;

   (a) Find the probability that 3 or more extruders are down.

   (b) What is the expected number of extruders down?

   (c) Find the variance for the number of extruders down.

   (d) Find the standard deviation for the number of extruders down.