EES 315: In-Class Exercise # 15

Instructions

1. Work alone or in a group of no more than three students. **The group cannot be the same as any of your former groups after the midterm.**
2. Only one submission is needed for each group.
3. You have two choices for submission:
   (a) Online submission via Google Classroom
   - PDF only.
   - Only for those who can directly work on the posted files using devices with pen input.
   - Paper size should be the same as the posted file.
   - No scanned work, photos, or screen capture.
   - Your file name should start with the 10-digit student ID of one member. (You may add the IDs of other members, exercise #, or other information as well.)

   (b) Hardcopy submission
4. **Do not panic.**

Date: 28 / 10 / 2020			
Name	ID (last 3 digits)		

1. Consider a random experiment in which you roll a six-sided fair dice (whose faces are numbered 1-6). We define the following random variable from the outcomes of this experiment:

$$Y(\omega) = (-1)^{\omega}.$$

a. Find all possible values of the random variable Y.

ω	1	2	3	4	5	5
$Y(\omega)$	-1	1	-1	1	-1	1

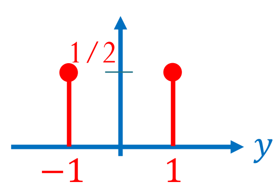
So, there are two possible values: -1 and 1.

b. Plot its probability mass function $p_Y(y)$. (Recall that we use stem plot for pmf.)

$Y(\omega) = 1$ when $\omega = 2,4,6$. Therefore, $P[Y=1] = P(\{2,4,6\}) = \frac{3}{6} = \frac{1}{2}$. (same as in Exc. 14)

$Y(\omega) = -1$ when $\omega = 1,3,5$. Therefore, $P[Y=-1] = P(\{1,3,5\}) = \frac{3}{6} = \frac{1}{2}$.

$$p_Y(y) \equiv P[Y=y] = \begin{cases} \frac{1}{2}, & y = -1,1, \\ 0, & \text{otherwise.} \end{cases}$$



c. Find $P[Y > -1]$.

We consider the two possible values of Y. Only "1" satisfies the condition "> -1".

Therefore, $P[Y > -1] = p_X(1) = \frac{1}{2}$.

d. Find $P[Y \le 1.0001]$.

Both "-1" and "1" satisfy the condition "≤ 1.0001". Therefore, $P[Y \le 1.0001] = p_X(-1) + p_X(1) = 1$.

e. (Optional) Plot $g(c) = P[Y \le c]$ for all values of c between -2 and 2. (c may not be an integer.)

This function is exactly the same as the cdf except that the argument is c instead of the usual y.
In particular, $g(c) = F_Y(c)$.