

W07 Homework A

Due date: Thursday 2/26, 11:59pm

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✍ Stop lights

Let X be the number of stop lights and Y the number of red lights at which you must wait on your drive to grounds each day. The joint PMF of X and Y is given below.

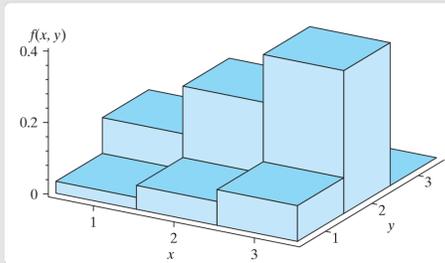
$X \backslash Y$	0	1	2
0	0.05	0.07	0.08
1	0.08	0.10	0.12
2	0.12	0.33	0.05

Find the marginal PMF of X and compute $E[X]$.

✍ Marginals from joint PMF

Suppose the discrete joint PMF of X and Y is given by:

$$P_{X,Y}(x,y) = \frac{xy^2}{30}, \quad x = 1, 2, 3, \quad y = 1, 2$$



Compute the marginal PMFs $P_X(x)$ and $P_Y(y)$.

✍ Grad student mentors

A university lab has an incoming group of researchers who need mentors. There are 4 graduate students, 2 undergraduate students, and the lab director who could serve as mentors. Suppose that exactly 3 of these 7 people will be selected as mentors.

- (a) How many different groups of 3 people could be chosen to be the three mentors?
- (b) Suppose exactly 2 graduate students and 1 undergraduate student are selected to be the three mentors. How many different groups of 3 people could be selected?

Let X be the total number of graduate students chosen to be mentors, and Y be the total number of undergraduate students chosen to be mentors.

- (c) Construct the joint PMF of X and Y : $P_{X,Y}(x, y)$

✍ Alice and Bob meeting at a cafe

Alice and Bob plan to meet at a cafe to do homework together. Alice arrives at the cafe at a random time (uniform) between 12:00pm and 1:00pm; Bob independently arrives at a random time (uniform) between 12:00pm and 2:00pm on the same day. Let X be the time, past 12:00pm, that Alice arrives (in hours) and Y be the time, past 12:00pm, that Bob arrives (in hours). So $X = 0$ and $Y = 0$ represent 12:00pm.

Find the joint PDF of X and Y . (Hint: X and Y are independent.)