Stat 2605 Tutorial 6

November 15, 2022

1. Suppose (X, Y) has joint pmf given by:

$f(x,y)$		x		
		1	2	3
	0	0.2	0.1	0.1
y	1	0.1	0.3	0
	2	0	0.1	0.1

and zero otherwise. Find $\mathbf{E}\left(2X^2Y + 1\right)$.

2. Suppose (X, Y) has joint pmf given by:

$f(x,y)$		x		
		2	3	4
	-1	0.1	0.2	0.05
y	0	0.27	0.1	0.15
	1	0	0.03	0.1

and zero otherwise.

(a) Are X and Y independent?

(b) Show that $\mathbf{E}\left(XY\right) \neq \mathbf{E}\left(X\right)\mathbf{E}\left(Y\right)$.

3. Suppose (X, Y) has joint pdf given by:

$$f(x,y) = \begin{cases} \dfrac{x+y}{3} & 0 < x < 2, \quad 0 < y < 1 \\ 0 & \text{otherwise} \end{cases}$$

(a) Find the marginal pdfs $f_X(x)$ and $f_Y(y)$.

(b) Are X and Y independent?

(c) Find the conditional mean $\mathbf{E}\left(Y \mid X = 1\right)$.

4. Suppose that the distribution of the lifetime of a light bulb has an exponential distribution with a mean of 900 hours. Find the probability that the total lifetime of 20 bulbs exceeds 22000 hours.

5. Suppose the random variable, X, has a Geometric(p) distribution, with pmf given by:

$$f(x) = \begin{cases} (1-p)^{x-1}p & x = 1, 2, \ldots \\ 0 & \text{otherwise} \end{cases}$$

Find the mgf, $M_X(t)$, and use it to find $\mathbf{E}(X)$.