

Answer on Question #77427 – Math – Statistics and Probability

Suppose that X and Y have the following joint probability function:

$f(x, y)$		X	
		2	4
Y	1	0.10	0.15
	3	0.20	0.30
	5	0.10	0.15

Question

(a) Find the expected value of $g(X, Y) = XY^2$

Solution

$$\begin{aligned} E(XY^2) &= \sum_x \sum_y XY^2 f(x, y) = 2 \cdot 1^2 f(2,1) + 4 \cdot 1^2 f(4,1) + 2 \cdot 3^2 f(2,3) + 4 \cdot 3^2 f(4,3) + \\ &+ 2 \cdot 5^2 f(2,5) + 4 \cdot 5^2 f(4,5) = 2 \cdot 0.1 + 4 \cdot 0.15 + 18 \cdot 0.2 + 36 \cdot 0.3 + 50 \cdot 0.1 + 100 \cdot 0.15 = \\ &= 35.2 \end{aligned}$$

Question

(b) Find μ_X and μ_Y

Solution

$$\begin{aligned} \mu_X &= \sum_x \sum_y x f(x, y) = 2f(2,1) + 2f(2,3) + 2f(2,5) + 4f(4,1) + 4f(4,3) + 4f(4,5) = \\ &= 2 \cdot 0.1 + 2 \cdot 0.2 + 2 \cdot 0.1 + 4 \cdot 0.15 + 4 \cdot 0.3 + 4 \cdot 0.15 = 3.2 \end{aligned}$$

$$\begin{aligned} \mu_Y &= \sum_x \sum_y y f(x, y) = f(2,1) + f(4,1) + 3f(2,3) + 3f(4,3) + 5f(2,5) + 5f(4,5) = \\ &= 0.1 + 0.15 + 3 \cdot 0.2 + 3 \cdot 0.3 + 5 \cdot 0.1 + 5 \cdot 0.15 = 3 \end{aligned}$$