

Answer on Question #69192 – Math – Statistics and Probability

Question

The joint probability distribution of two random variables X and Y is given below. Find the marginal distributions and $P(Y=3/X=2)$

f(x,y)	x	
	y	2 4
1	0.1	0.15
3	0.2	0.3
5	0.1	0.15

Solution

Marginal distribution of X:

$$f_x(2) = P(X = 2) = 0.1 + 0.2 + 0.1 = 0.4$$

$$f_x(4) = P(X = 4) = 0.15 + 0.3 + 0.15 = 0.6$$

x	2	4
$f_x(x)$	0.4	0.6

Marginal distribution of Y:

$$f_y(1) = P(Y = 1) = 0.1 + 0.15 = 0.25,$$

$$f_y(3) = P(Y = 3) = 0.2 + 0.3 = 0.5,$$

$$f_y(5) = P(Y = 5) = 0.1 + 0.15 = 0.25$$

y	1	3	5
$f_y(y)$	0.25	0.5	0.25

$$P(Y=3/X=2) = \frac{P(X=2 \cap Y=3)}{P(X=2)} = \frac{f(2,3)}{f_x(2)} = \frac{0.2}{0.4} = \frac{1}{2} = 0.5.$$