

Answer on Question #79554 – Math – Statistics and Probability

Question

Let X and Y be discrete random variables whose possible values are $X=0$ and 10 , and $Y= -20$ and 10 .

The joint distribution of (Y,X) depends on the unknown parameter c . The probabilities of the

possible values are given in the cells of the following table:

	$Y = -20$	$Y = 10$
$X = 0$	$0.15 + c$	0.3
$X = 10$	$0.35 - c$	0.2

a) You know that $E(4X+Y)=13$. What is the value of c ? Use this value for the remainder of this question (if you're unable to find this value, for partial credit carry out the remaining calculations assuming it's unknown, i.e. keeping the symbol c in your expressions).

Solution

We have

$$\begin{aligned} E(4X + Y) &= (4 \cdot 0 + (-20))P(X = 0, Y = -20) + (4 \cdot 0 + 10)P(X = 0, Y = 10) + \\ &+ (4 \cdot 10 + (-20))P(X = 10, Y = -20) + (4 \cdot 10 + 10)P(X = 10, Y = 10) = \\ &= -20 \cdot (0.15 + c) + 10 \cdot 0.3 + 20 \cdot (0.35 - c) + 50 \cdot 0.2 = 17 - 40c \end{aligned}$$

From $E(4X + Y) = 13$ then $17 - 40c = 13$, and

$$c = 0.1.$$

Answer: 0.1.