Answer on Question #64974 – Math – Statistics and Probability

Question

Determine the value of c so that the following functions represent the joint pmf of the random variables X and Y.

i) $f(x,y) = c(x+y+1), x = 0,1,2,3; y = 0,1,2.$

Solution

Since $f(x,y)$ is a joint probability mass function (abbreviated p. m. f.) **[1]** then

$$\sum_{x=0}^{3}\sum_{y=0}^{2} c(x+y+1) = 1$$

Now we shall expand this double sum **[2]**.

Expanding the second sum we get:

$$c\sum_{x=0}^{3}(x+0+1+x+1+1+x+2+1) = c\sum_{x=0}^{3}(3x+6) = 1.$$

Expanding the first sum we get

$$c(3\cdot 0+6+3\cdot 1+6+3\cdot 2+6+3\cdot 3+6) = 42c = 1 \Rightarrow c = \frac{1}{42}.$$

Answer: $\frac{1}{42}$.

Question

Determine the value of c so that the following functions represent the joint pmf of the random variables X and Y.

ii) $f(x,y) = c(x^2+y^2), x = -1,1; y = -2,2.$

Solution

We have the following distribution:

$X\backslash Y$	-2	2
-1	$5c$	$5c$
1	$5c$	$5c$

Since $f(x,y)$ is a p. m. f. then we have

$$5c+5c+5c+5c = 1 \Rightarrow 20c = 1 \Rightarrow c = \frac{1}{20}.$$

Answer: $\frac{1}{20}$.

References:

[1] PennState Eberly College of Science. STAT 414 Intro Probability Theory. Lesson 17. Two Discrete Random Variables. Retrieved from https://onlinecourses.science.psu.edu/stat414/node/104.

[2] Double Series. Retrieved from http://mathworld.wolfram.com/DoubleSeries.html.