$$E(XY) = \sum_x \sum_y xy\, f(x,y) = 2\left(\frac{1}{10}\right)+6\left(\frac{4}{10}\right)+8\left(\frac{1}{10}\right)+12\left(\frac{2}{10}\right)+15\left(\frac{2}{10}\right)$$

$$= \frac{88}{10} = 8.8$$

$$E(X) = \sum_{x=1}^{3} x\, f(x) = 1\left(\frac{1}{10}\right)+2\left(\frac{5}{10}\right)+3\left(\frac{4}{10}\right) = \frac{23}{10} = 2.3$$

$$E(Y) = \sum_{y=2}^{5} y\, f(y) = 2\left(\frac{1}{10}\right)+3\left(\frac{4}{10}\right)+4\left(\frac{3}{10}\right)+5\left(\frac{2}{10}\right) = \frac{36}{10} = 3.6$$

$$Cov(X,Y) = 8.8 - (2.3)(3.6) = 0.52$$

$$Var(X) = E(X^2) - (E(X))^2$$

$$E(X^2) = \sum_{x=1}^{3} x^2 f(x) = 1\left(\frac{1}{10}\right)+4\left(\frac{5}{10}\right)+9\left(\frac{4}{10}\right) = \frac{57}{10} = 5.7$$

$$Var(X) = 5.7 - (2.3)^2 = 0.41$$

$$Var(Y) = E(Y^2) - (E(Y))^2$$

$$E(Y^2) = \sum_{y=2}^{5} y^2 f(y) = 4\left(\frac{1}{10}\right)+9\left(\frac{4}{10}\right)+16\left(\frac{3}{10}\right)+25\left(\frac{2}{10}\right) = \frac{138}{10} = 13.8$$

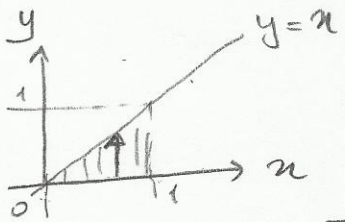
$$Var(Y) = 13.8 - (3.6)^2 = 0.84$$

$$\rho_{XY} = \frac{0.52}{\sqrt{(0.41)(0.84)}} = 0.8861 > 0$$

X ve Y rd. arasında (+) yönde güçlü bir ilişki olduğu söylenebilir.

Cevap 2

a) $\int_0^1 \int_0^x cx\, dy\, dx = 1$ olmalıdır.



$0 \le y \le x < 1$, $y = x$

$$c\int_0^1 xy\Big|_0^x dx = c\int_0^1 x^2\, dx = c\,\frac{x^3}{3}\Big|_0^1 = c\,\frac{1}{3} = 1 \Rightarrow \boxed{c = 3}$$

$$\therefore f(x,y) = \begin{cases} 3x & 0 \le y \le x < 1 \\ 0 & dd \end{cases}$$

b) X'in marjinal dağılımı:

$$f(x) = \int_0^x 3x\, dy \qquad 0 \le x \le 1$$