School of Mathematics(SOM)

Thapar Institute of Engineering and Technology (TIET)

Probability and Statistics(UCS410) Exp. sheet 06 (Joint probability mass and density functions)

---

(1) The joint probability density of two random variables X and Y is

$$f(x,y) = \begin{cases} 2(2x+3y)/5; & 0 \le x, y \le 1 \\ 0; & elsewhere \end{cases}$$

Then write a R-code to

(i) check that it is a joint density function or not? (Use integral2())

(ii) find marginal distribution $g(x)$ at $x = 1$.

(iii) find the marginal distribution $h(y)$ at $y = 0$.

(iv) find the expected value of $g(x,y) = xy$.

(2) The joint probability mass function of two random variables X and Y is

$$f(x,y) = \{(x+y)/30;\ \ x = 0,1,2,3;\ \ y = 0,1,2\}$$

Then write a R-code to

(i) display the joint mass function in rectangular (matrix) form.

(ii) check that it is joint mass function or not? (use: Sum())

(iii) find the marginal distribution $g(x)$ for $x = 0,1,2,3$. (Use:apply())

(iv) find the marginal distribution $h(y)$ for $y = 0,1,2$. (Use:apply())

(v) find the conditional probability at $x = 0$ given $y = 1$.

(vi) find $E(x), E(y), E(xy), Var(x), Var(y), Cov(x,y)$ and its correlation coefficient.