Department of Mathematics

MIT, Manipal

Engineering Mathematics IV-MAT2227

IA-2

Instructions: Answer all the questions.

(1) A bag contains 3 white marbles and 2 red marbles, marbles are drawn from the bag randomly one after the other (without replacement) until all the white marbles are drawn. Let $X$ denote the number of draws required to get the first white marble and $Y$ denote the number of additional draws required to get the second white marble. find (i) joint probability distribution of $X$ and $Y$. (ii) correlation coefficient.
[2 marks]

(2) The joint density function of $X$ and $Y$ is given by
$f(x,y) = \begin{cases} kxy & 0 \leq x \leq 3, x \leq y \leq 4x - x^2 \\ 0 & otherwise \end{cases}$.
Find (i) the value of $k$. (ii) the marginal density functions of $X$ and $Y$, respectively.
[1.5 marks]

(3) Find the moment generating function of the random variable $X$ with density function $f(x) = \begin{cases} 1 & 0 \leq x \leq 1 \\ 0 & otherwise \end{cases}$. Hence find the mean and variance of $X$. [1.5 marks]