Engineering Mathematics-IV (MAT 2226)

Assignment 2

1. In a factory, Machines A, B, C are producing chips of same length. Machines A, B, C produces 1%, 4%, 2% defective chips respectively. Of the total production of chips in the factory, Machine A produces 30%, B produces 25%, and C produces 45%.
   i)   If one chip is selected at random from the total chips produced in a given day, determine the probability that it is defective.
   ii) Given that the selected chip is defective find the probability that it was produced by Machine B.   **(1 Mark)**

2. Urn A contains 8 white and 7 black balls, Urn B contains 9 black and 7 white balls. A ball is randomly drawn from A and placed in B. And then a ball is transferred from B to A. Finally, a ball is selected from A. What is the probability that the ball is white?   **(1 Mark)**

3. A continuous random variable X has the distribution function

   $$f(x)=\begin{cases} 0 \, , & if \quad x \le 1 \\ k(x-1)^4 \, , & if \ 1 \le x \le 3 \\ 1 & if \ \ x > 3 \end{cases}$$

   Find   i). k   ii). Cdf of X   iii) mean of X   **(1 Mark)**

4. A two dimensional random variable (X, Y) has the joint pdf $f(x) = \begin{cases} \frac{1}{2}, (x,y) \in R \\ 0, \ otherwise \end{cases}$,

   where R is the region bounded by parallelogram with vertices
   (0,0), (2,0), (1, 1), (3, 1). Then find the marginal probability distributions of X and Y. Also, find the correlation co-efficient between X and Y.

   (1 Mark)

5. The joint probability distribution of X and Y is given by $P_{ij} = k(i + j), \ i = 1,2,3,4$ and $j = 1,2,3$. Then find
   a. k
   b. Marginal probability distributions of X and Y.
   c. Conditional probability distribution of X given $Y = y_j$.
   d. Conditional probability distribution of Y given $X = x_i$.

   (1 Mark)