

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
$$f(x)=\begin{cases} 0, & \text{if } x \leq 1 \\ k(x-1)^4, & \text{if } 1 \leq x \leq 3 \\ 1, & \text{if } x > 3 \end{cases}$$
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 $f(x, y) = \begin{cases} \frac{1}{2}, & (x, y) \in R \\ 0, & \text{otherwise} \end{cases}$, 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)**