MM 225 – 2024-25 (1)

In class tutorial: 8 August 2024

1. A group of 5 boys and 10 girls is lined up in random order — that is, each of the 15! permutations is assumed to be equally likely.
    a. What is the probability that the person in the 4th position is a boy?
    b. What about the person in the 12th position?
    c. What is the probability that a particular boy is in the 3rd position?
2. A closet contains 8 pairs of shoes. If 4 shoes are randomly selected, what is the probability that there will be (a) no complete pair and (b) exactly 1 complete pair?
3. The distribution function of the random variable X is given

$$F(x) = \begin{cases} 0 & for\ x < 0 \\ x/2 & for\ 0 \le x < 1 \\ \frac{2}{3} & for\ 1 \le x < 2 \\ \frac{11}{12} & for\ 2 \le x < 3 \\ 1 & for\ 3 \le x \end{cases}$$

    a. Plot the distribution function
    b. What is P{X > 12}?
    c. What is P{2 < X ≤ 4}?
    d. What is P{X < 3}?
    e. What is P{X = 1}?
4. A contractor purchases a shipment of 100 transistors. It is his policy to test 10 of these transistors and to keep the shipment only if at least 9 of the 10 are in working condition. If the shipment contains 20 defective transistors, what is the probability it will be kept?