Tutorial-6

Question-1

Determine the expected value and the variance of X, a hypergeometric random variable with parameters n, N, and m.
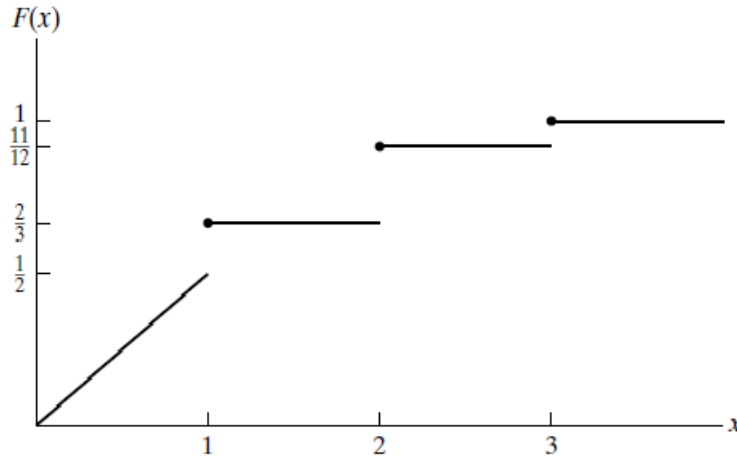
Question-2

Find the expected value of the sum obtained when n fair dice are rolled.

Question-3

The distribution function of the random variable X is given by-

$$
F(x)= \begin{cases} 0, x < 0 \\ \frac{x}{2}, 0 \leq x < 1 \\ \frac{2}{3}, 1 \leq x < 2 \\ \frac{11}{12}, 2 \leq x < 3 \\ 1, 3 \leq x \end{cases}
$$

A graph of F(x) is presented in Figure Compute

$$(a)P\{X < 3\}\quad(b)P\{X = 1\}\quad(c)P\{X > \frac{1}{2}\}\quad(d)P\{2 < X \leq 4\} \tag{1}$$

Question-4

The lifetime in hours of a certain kind of radio tube is a random variable having a probability density function given by-

f(x)= $\begin{cases} 0, x \leq 100 \\ \frac{100}{x^2}, x > 100 \end{cases}$

What is the probability that exactly 2 of 5 such tubes in a radio set will have to be replaced within the first 150 hours of operation? Assume that the events E_i, i =1, 2, 3, 4, 5, that the ith such tube will have to be replaced within this time are independent.

Question-5

A stick of length 1 is split at a point U that is uniformly distributed over (0, 1). Determine the expected length of the piece that contains the point p, $0 \leq p \leq 1$.

Question-6 Let X be uniformly distributed over $(\alpha, \beta). Find-$
$(a)E[X]$
$(b)Var(X).$