

Tutorial Set-2

Subject: Statistical Methods & Data Analysis (MA 231)

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1. A random variable has the following probability mass function:

Values of X	0	1	2	3	4	5	6	7
$f(x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

- i.* Find k *ii.* Construct the distribution function *iii.* Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$.

2. For the following probability density function

$$f(x) = ke^{-|x|}, \quad -\infty < x < \infty$$

Show that $k = 1/2$. Find the corresponding distribution function.

3. The diameter of an electric cable is assumed to be a continuous random variable with p.d.f: $f(x) = kx(1-x)$, $0 < x < 1$. Find the value of k . Also find the average diameter and variance of the cable.

4. Let X be a discrete random variable whose spectrum consists of the points $x_i = (-1)^{i+1}3^i / i$ with probability mass function $P(X = x_i) = 2/3^i$ for $i = 1, 2, 3, \dots$. Calculate $E(X)$, if exists.

5. Let X be a continuous random variable with pdf given by

$$f(x) = \begin{cases} 2/x^3, & x \geq 1 \\ 0, & x < 1. \end{cases}$$

Calculate $E(X)$ and $E(X^2)$, if exist.

6. Alpha Motors is the dealer of a leading car company in Gujrat. It conducted an analysis of sales in the past 200 days for opening a new showroom in another locality. Data collected on the number of cars sold in the past 200 days revealed that there were 25 days with zero cars sold, 50 days with one car sold, 75 days with two cars sold, 20 days with three cars sold, and 30 days with four cars sold. Find the expected number of cars sold on any day. Also find the variance for the number of cars sold during a day.

7. Let X be a continuous random variable with pdf given by

$$f(x) = \begin{cases} e^{-2x} + \frac{1}{2}e^{-x}, & x > 0 \\ 0, & \text{otherwise.} \end{cases}$$

Write the MGF of X . Using it compute the mean and variance of X .