## Probability Distributions Review Worksheet

### Question no 1-

The distribution function for a random variable $X$ is

$$F(x) = \begin{cases} 1 - e^{-2x} & x \geq 0 \\ 0 & x < 0 \end{cases}$$

Find (a) the density function, (b) the probability that $X > 2$, and (c) the probability that $-3 < X \leq 4$.

### Question no 2

The joint probability function of two discrete random variables $X$ and $Y$ is given by $f(x, y) = c(2x + y)$, where $x$ and $y$ can assume all integers such that $0 \leq x \leq 2$, $0 \leq y \leq 3$, and $f(x, y) = 0$ otherwise.

(a) Find the value of the constant $c$.
(b) Find $P(X = 2, Y = 1)$.
(c) Find $P(X \geq 1, Y \leq 2)$.

### Question no 3

The joint density function of two continuous random variables $X$ and $Y$ is

$$f(x, y) = \begin{cases} cxy & 0 < x < 4, 1 < y < 5 \\ 0 & \text{otherwise} \end{cases}$$

(a) Find the value of the constant $c$.
(b) Find $P(1 < X < 2, 2 < Y < 3)$.
(c) Find $P(X \geq 3, Y \leq 2)$.

### Question no 4

A continuous random variable $X$ has probability density given by

$$f(x) = \begin{cases} 2e^{-2x} & x > 0 \\ 0 & x \leq 0 \end{cases}$$

Find (a) $E(X)$, (b) $E(X^2)$.

### Question no 5

**EXAMPLE 3.1** Suppose that a game is to be played with a single die assumed fair. In this game a player wins $20 if a 2 turns up, $40 if a 4 turns up; loses $30 if a 6 turns up; while the player neither wins nor loses if any other face turns up. Find the expected sum of money to be won.