**Q22)- Explain PROBABILITY MASS FUNCTION (PMF) and PROBABILITY DENSITY FUNCTION (PDF). and what is the difference between them?**

**Probability Mass Function (PMF):-**

The Probability Mass Function (PMF) gives the probability that a discrete random variable is exactly equal to some value. It maps each value of the random variable to its probability. PMF is used for discrete random variables.

**Probability Density Function (PDF):-**

The Probability Density Function (PDF) describes the relative likelihood for a continuous random variable to take on a particular value. However, unlike PMF, the PDF does not give the probability at a single point but rather the density of probabilities at that point. PDF is used for continuous random variables. A continuous random variable is one that takes on an infinite number of possible values, usually within a certain range or interval.

Differences Between PMF and PDF:-

1) Type of Variable:

PMF is used for discrete random variables (e.g., the roll of a die, the number of students in a class).

PDF is used for continuous random variables (e.g., height, weight, time).

2) Output:

PMF provides the probability of the random variable taking an exact value.

PDF provides a probability density, not the probability of the random variable taking a specific value, since the probability at a single point for a continuous variable is zero.

**23) What is correlation. Explain its type in details.what are the methods of determining correlation**

Correlation is a statistical measure that describes the strength and direction of a relationship between two variables. It indicates how one variable may change when the other variable changes. Correlation does not imply causation, meaning that just because two variables are correlated does not necessarily mean that one causes the other to change.

**Types of Correlation**

Positive Correlation:

A positive correlation exists when an increase in one variable is associated with an increase in the other variable.

Negative Correlation:

A negative correlation exists when an increase in one variable is associated with a decrease in the other variable.

Zero Correlation (No Correlation):

Zero correlation exists when there is no apparent relationship between the variables. Changes in one variable do not predict changes in the other.

Perfect Correlation:

Perfect Positive Correlation: All data points lie exactly on a line with a positive slope.

Perfect Negative Correlation: All data points lie exactly on a line with a negative slope. For instance, if the correlation coefficient

**Methods to Determine Correlation:**

Pearson Correlation Coefficient

Spearman’s Rank Correlation Coefficient

Kendall’s Tau:

Point-Biserial Correlation