

1. Give any two examples of discrete and continuous variables

A. For continuous variables

1. Height of the person

2. Temperature

For discrete variables

1. Students in a class

2. State advantages of Sampling over the census.

A. 1. Low cost of sampling

2. less time-consuming in sampling

3. scope of sampling is high

3. Define various measures of Central tendency.

A. Measures of Central tendency are summary of statistics that represents the central point or typical value in the dataset. Types of various measures of Central tendency

1. Mean: Mean is the arithmetic average

$$\text{Mean} = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n}$$

2. Median: the middle value in an ordered dataset

3. Mode: the most frequent value.

4. What do you mean by coefficient of variance and why is it used?

A. The coefficient of variation (CV) is a relative measure of variability that indicates the size of a standard deviation in relation to its mean.

It is a standardized, unitless measure that allows you to compare variability between disparate groups and characteristics. It is also known as the relative standard deviation (RSD).

$$CV = \frac{\text{Standard deviation}}{\text{Mean}}$$

Use the coefficient of variation when you want to compare variability between:

- Groups that have means of very different magnitudes.
- Characteristics that use different units of measurements.

5. Find the average and median weight of the students from the following weights

50, 45, 52, 47, 61, 72, 54

A. mean = $\frac{50 + 45 + 52 + 47 + 61 + 72 + 54}{7}$

$$= \frac{381}{7}$$

$$= 54.42$$

Median = 45, 47, 50, 52, 54, 61, 72

$$= 52$$

6. Define various measures of dispersion and state its formulas.

A. Measures of variability is a summary statistics that represents the amount of dispersion in a database.

Measures of variability define how far away the data points tend to fall from the centre.

1. Range : The range of a dataset is the difference between the largest and smallest values in the dataset.

$$\text{Range} = \text{higher value} - \text{lowest value}$$

2. Variance: Variance is the average squared difference of the values from the mean

$$1. \text{ population variance : } \sigma^2 = \frac{\sum (X - \mu)^2}{N}$$

$$2. \text{ sample variance : } s^2 = \frac{\sum (X - \bar{x})^2}{n - 1}$$

3. Interquartile range :

A. IQR measures the spread of the middle half of your data

$$IQR = Q3 - Q1$$

4. Standard deviation : The standard deviation is the average amount of variability in your dataset. It tells you, on average, how far each value lies from the mean.

1. Population deviation:

$$\sigma = \sqrt{\frac{\sum (X - \mu)^2}{N}}$$

2. sample deviation

$$s = \sqrt{\frac{\sum (X - \bar{x})^2}{n - 1}}$$

7. Calculate variance, standard deviation, and coefficient of variation for the following frequency distribution:

x	2	4	6	8	10
f	2	4	14	8	2

$$A. \text{ Variance} = \sigma^2 = \frac{\sum (X - \mu)^2}{N}$$

$$\text{Mean} = 2+4+14+8+2/5$$

$$= 30/5$$

$$= 6$$

$$\text{Variance} = 16+4+64+4+16/5$$

$$= 104/5$$

$$= 20.8$$

$$\text{SD} = \sqrt{20.8}$$

$$= 4.56$$

8. Define sample space and sample point.

A. The set of all possible outcomes of an event is called the sample space

A sample point is a possible outcome of an event and it is a subset of sample space

9. Write down the sample space for the following experiments. Also, state whether it is discrete or continuous.

a) A result in the examination of three students.

A.a. $S = \{PPP, PPF, PFP, PFF, FPP, FPF, FFP, FFF\} = 8$ F=fail, P=pass

The sample space is discrete.

b) The number of defective mobile sets in a group of 10 mobiles.

A.b. Discrete

c) A fair die and a coin is tossed simultaneously and write down the sample space for the experiment.

A.c. $S = \{1, 2, 3, 4, 5, 6, H, T\}$

Continuous

d) Tossing a coin until the head appears for the first time

A. Discrete

e) A two-digit number is formed using the digit 4, 5, 6 using each digit only once.

A. Continuous

10. What do you mean by impossible event and sure event?

A. If the probability of occurrence of an event is 0, such an event is called an **impossible event** and if the probability of occurrence of an event is 1, it is called a **sure event**.

11. A loaded die has the following assignment of probabilities to its six faces as: $p(1)=0.1$, $p(2)=0.2$, $p(3)=0.3$, $p(4)=0.25$, $p(5)=0.05$, $p(6)=0.10$

a. Occurrence of even numbers.

A.a. even numbers in a die is $\{2, 4, 6\}$

$$P(E) = P(2) + P(4) + P(6)$$

$$= 0.2+0.25+0.10$$

$$= 0.55$$

b. Occurrence of numbers less than 4.

$$\text{A.b. } E=\{1,2,3\}$$

$$P(E) = P(1)+P(2)+P(3)$$

$$= 0.1+0.2+0.3$$

$$= 0.6$$

12. Let A and B are two events of Ω such that $p(A)=0.8$, $p(B)=x$ and $p(A \cup B)=0.9$. Find the value of x such that A and B are independent.

$$\text{A. } p(A \cup B) = P(A)+p(B)-P(A).P(B)$$

$$0.9=0.8+x-0.8*x$$

$$x-0.8x=0.1$$

$$x(1-0.8)=0.1$$

$$x(0.2)=0.1$$

$$x=1/2$$