**1. Give any two examples of discrete and continuous variables.**

Examples of discrete:

* Number of siblings someone has.
* Number of pages in book.

Examples of continues:

* Height of a person.
* Distance travelled by car.

**2. State advantages of Sampling over census.**

Sampling is a statistical technique used to select a representative subset of a population for research or analysis.

* Advantages of Sampling:
* Cost effective
* More Feasible
* Greater accuracy
* More manageable data

**3. Define various measures of Central tendency.**

Measures of central tendency are statistical measures that describe the typical or central value of a set of data.

Three most common measures of central tendency:

1. Mean: Average value of the Data is called mean.
2. Median: Arrange the data in ascending order of ungrouped data. The median is the middle value in a dataset.
3. Mode: A dataset can have more than one mode if multiple values occur with the same frequency.

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

The coefficient of variation (CV) is a statistical measure that expresses the degree of variation or dispersion of a set of data relative to its mean. It is calculated as the ratio of the standard deviation to the mean, expressed as a percentage.

CV= (Standard Deviation/Mean) \*100

The coefficient of variation is used to compare the variability of two or more datasets that have different means. It is often used in situations where the standard deviation of the data is large relative to the mean, such as in financial or economic data.

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

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

Average = 50+45+52+47+61+72+54 = 381/7 = 54.43

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

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

Measures of dispersion are used to describe how spread out a set of data is. There are several measures of dispersion, including the range, interquartile range, variance, and standard deviation.

Range = Max Value – Min Value

IQR = Q3 – Q1

Variance = (Σ (xi - x̄) ²) / (n - 1)

Standard Deviation = √ (Σ (xi - x̄) 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**

Mean = (2\*2+4\*4+6\*14+8\*8+10\*2)/(2+4+14+8+2 )= 6.26

Var(X) = [Σ(F\*(X - Mean)^2)] / N

= [(2\*(2-6.4)^2) + (4\*(4-6.4)^2) + (14\*(6-6.4)^2) + (8\*(8-6.4)^2) + (2\*(10-6.4)^2)] / (2+4+14+8+2)

= 7.84

SD(X) = sqrt(Var(X)) = sqrt(7.84) = 2.8

CV = (SD / Mean) x 100% = (2.8 / 6.4) x 100% = 43.75%

**8. Define sample space and sample point.**

In probability theory, the sample space is the set of all possible outcomes of an experiment or random event. It is denoted by the symbol "S". For example, if the experiment is tossing a coin, then the sample space consists of two possible outcomes: "heads" or "tails".

A sample point, also known as an elementary event, is an individual outcome or element of the sample space. It represents a possible outcome of the experiment or event being considered. For example, if the experiment is tossing a coin, then a sample point is either "heads" or "tails".

**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.**

If result will be in Grade like (A, B, C, D, F)

Result can be of Three Students (AAA), (AAB), (AAC), (ABC), (AAF), (ABF), (ACF), (….), (FFF)

Sample space of Result will discrete.

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

(0,1,2,3,4,5,6,7,8,9,10)

Each element represents defective mobile set. So, sample space is discrete and outcomes are distinct.

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

(1,H), (1,T), (2,H), (2,T), (3,H), (3,T), (4,H), (4,T), (5,H), (5,T), (6,H), (6,T)

Each outcome represents the number of dies 1 to 6 and the facing of coin ‘H’ & ‘T’. It’s Sample space is discrete so outcome is distinct.

**d) Tossing a coin until head appears on the first time**

The question is not a finite & fixed. And also, no upper limit. It will Continuous

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

{45, 46, 54, 56, 64, 65} The Sample space is discrete and outcomes are distinct.

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

Impossible event is the event that cannot happen.

Sure, event is the event that will always happen.

**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. What is the probability of occurrence of**

**a. Occurrence of even numbers.**

P(even) = P(2) + P(4) + P(6)

= 0.2 + 0.25 + 0.10 = 0.55

**b. Occurrence of numbers less than 4.**

P(<4) = 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∪B)=0.9. Find the value of x such that A and B are independent.**

P(A∩B) = P(A) × P(B)

P(B) = P(A∩B) / P(A)

p(A') = 1 - p(A) = 1 - 0.8 = 0.2

p(A∪B) = p(A) + p(B) - p(A∩B)

0.9 = 0.8 + p(B) - p(A∩B)

p(B) = 0.1 + p(A∩B)

0.1 + P(A∩B) = P(A∩B) / P(A)

0.1 P(A) + P(A∩B) = P(A∩B)

0.9 P(A∩B) = 0.1 P(A)

P(A∩B) = 0.1 P(A) / 0.9

P(A∩B) = 0.111

P(A) × P(B) = P(A) × x

0.8 × x = 0.111

x = 0.139