Q1) Define frequency Distribution and explain its significance in data analysis.

A frequency distribution is a way to organize data by showing the number of occurance (frequency) of each distinct value in a dataset.
It divides the data into categories, intervals, or classes and then counts how many data points lies into each category.

Types of frequency distribution

i) Ungrouped frequency " ii) Grouped frequency "
Each individual value in the dataset is listed along with its frequency

Data is grouped into classes or intervals and the frequency of each class is recorded.

Significance :

i) Simplifies Data : It organises raw data into a structured format that is easy to understand.

ii) Reveals Patterns and Trends : By analysing the frequency distribution, you can identify the central tendancy (like the mode) and the spread (range, variance) of the data.

It also known as Non-

iii) Facilitates Comparison:
Graphical or Tabular representations make it easy to compare different intervals or classes.

iv) Foundation for further Statistical Analysis
Frequency distri serve as the foundation for creating histograms, bar charts, etc.

v) Identifies Outliers:
By examining the frequency distri.. unusal unusual data points (outliers) can be identified.

Sol.)

Data	Tally mark	Frequency	Cumulative frequency
12	I	1	1
15	III	3	4
18	II	2	6
20	II	2	8
22	I	1	9
24	I	1	10

Q.) Given a set of data how would you decide the number of classes to use when constructing a freq. distn. table.

Sol:) The number of classes in a frequency distribution table should balance the overall spread of data and simplicity, allowing for meaning ful analysis without over whelming complexity.

Range of Data: "If the overall spread of data has a large range, more classes may be needed, to capture the detail.

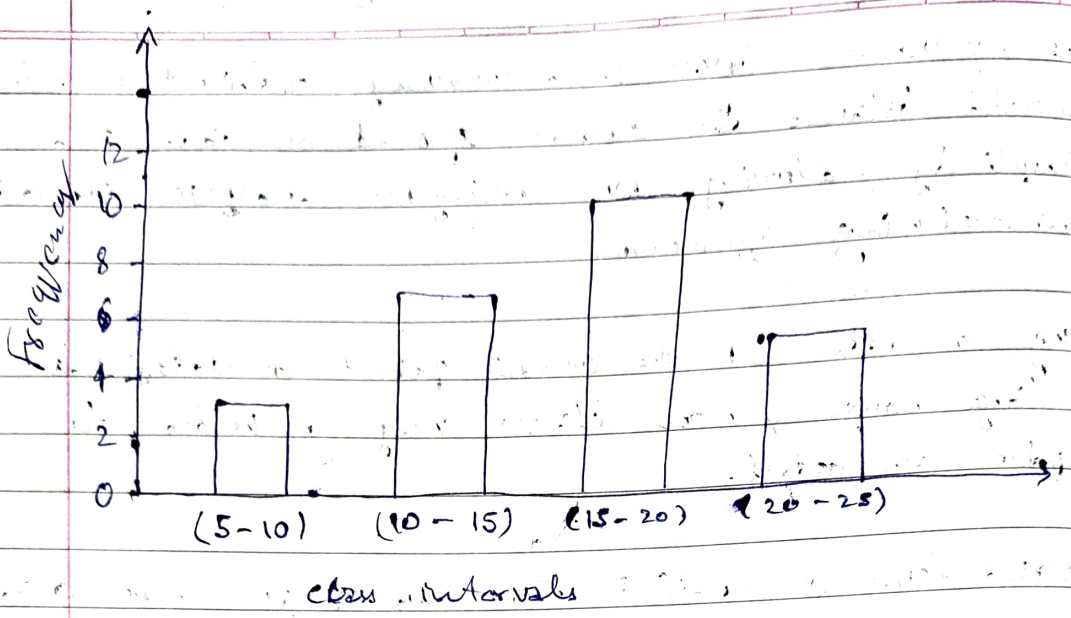
Desired level of Detail: More classes give more detail but also can make the table harder to interpret. Fewer classes provide a more general overview. But might over simplify the Data.

Consistency: Sometimes you may need to choose a no. of classes that aligns our purpose of analysis.

Methods like Sturges' Rule, the Square Root choice, and the Rice Rule provide straight forward calculations for us to decide the no. of classes.

Ex.6)

~~Class Intervals~~	class Intervals	Tally marks	frequency
~~15 - 20~~	15 - 19	11	2
~~21 - 25~~	20 - 24	11	2
	25 - 29	11	2
	30 - 34	11	2
	35 - 39	1	1
	40 - 44	1	1



Q4). Relative Frequency

i) Definition: The proportion of the total data that falls within a specific class interval.

Purpose: To compare the significance of each class relative to the entire dataset.

Formula: $R.F = \frac{\text{Freque of a class}}{\text{Total no. of Observations}}$

$RF = \frac{\text{Freq of a class}}{\text{Total no. of observs}}$

Range of Values: Range of values typically expressed as a decimal or percentage ranging from 0 to 1.

Cumulative frequency

The running total of frequencies showing the accumulation of data points upto a certain class interval.

To understand how data accumulates across intervals.

Sum of the frequency of the current class and all preceding classes.

Values increases from one class to the next culminating in the total no. of observations

Use case	Used to compare the size of different groups relative to the whole.	Used to determine cumulative percentage, thresholds, and to identify trends over interval.

Example : Given Data : 15, 17, 20, 22, 28, 28, 30, 33, 35, 40

Class Interval	Frequency	Relative Frequency	Cumulative freq
10 - 19	2	$\frac{2}{10} = 0.2$ 20%	2
20 - 29	4	$\frac{4}{10} = 0.4$ 40%	2 + 4 = 6
30 - 39	3	$\frac{3}{10} = 0.3$ 30%	6 + 3 = 9
40 - 49	1	$\frac{1}{10} = 0.1$ 10%	9 + 1 = 10

Q5.) Explain the concept of inclusive and exclusive class intervals. with example.

i) Inclusive Class intervals

Inclusive " " include both the lower and upper boundaries of the interval.

This means that if a data point equals the upper boundary of an interval, it is counted within that interval.

Use case Inclusive intervals are commonly used when dealing with discrete data.

With Inclusive intervals, there is no confusion about where to place a data if it equals to the boundary.

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Example

Class Intervals	Data points
10 - 19	10, 15, 19
20 - 29	20, 25, 29
30 - 39	30, 33, 39

Exclusive Class Intervals

Exclusive class Interval include the lower boundary but exclude the upper boundary.
This means that if a data point fall on the or equals on the upper boundary of an interval it is counted in the next interval.

Exclusive intervals are often used when dealing with continuous data or when it's essential to ensure that data point do not overlap between intervals.

Example

Class Interval	Data point
10 - 20	10, 15, 19
20 - 30	20, 25, 29
30 - 40	30, 33, 39