

Chapter 3:

3.1 - 3.6

Descriptive Statistics

Numerical Measure

Measures of Location
"Central tendency"

Measure of Variation
"Dispersion"

* Measure of ~~var~~ Location

③ Mode

① Mean

② Median

⑤ Quartiles

④ Percentiles

* Mean :- The most important measure of location
"arithmetic average"

- For sample

$$\text{sample mean} = \bar{x} = \frac{\sum x_i}{n}, \quad n: \text{sample size}$$

- For population

$$\text{pop. mean} = \mu = \frac{\sum x_i}{N}, \quad N: \text{pop. size}$$

\bar{x} is a point estimator for μ

** we will find Mean by using 8D Mode in
a scientific calculator

Exp:- Given the sample 45, 95, 80, 60, 77, 51

Find the Mean

3.2 - 1.8

$$\text{Mean} = \bar{X} = \frac{\sum x_i}{n} = 68$$

* Median is the middle value

How to Find Median

① Sort the Data (ascending orders)

② Median position \rightarrow If n is odd: Median is the middle value
position = $\frac{n+1}{2}$

\rightarrow If n is even: Median is the average of the two middle value
position = $\left[\frac{n}{2}, \frac{n}{2} + 1 \right]$

Exp: Find Median for :-

① 22, 10, 18, 22, 16, 17, 20

Median = 18

② 120, 150, 144, 117, 112, 138

Median = 129

Notes

• Mean is the most important measure of location

• If the Data contains extreme value \rightarrow The Median

The Median is the best measure of location

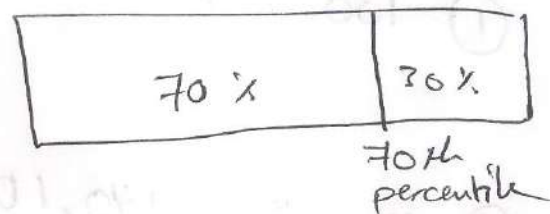
*Mode :- The value that has highest frequency

Find the Mode of the following :-

- ① 100, 140, 120, 123, 137
- ② 140, 123, 140, 100, 140, 100, 99
- ③ 8, 12, 15, 8, 12, 18, 17, 10
- ④ A, AB, O, O, O, B, O, AB, A, O
- ⑤ 150, 150, 140, 130, 140, 120, 130, 110,

* Percentile P^{th} - percentile :- is the value that approximately $P\%$ of Data value are \leq it and $(1-P)\%$ are \geq it

For example: 70th percentile = P_{70}



How to Find a Percentile

① Sort data

② Compute i where

$$i = \left(\frac{P}{100} \right) * n$$

i : index position

case 1 :- If i is not integer \rightarrow round up to next integer position

case 2 :- If i is integer \rightarrow the P^{th} percentile is the average of the two values in the i and $i+1$ position

Exp: Given the Data : 12, 18, 15, 25, 10, 8, 12, 9

① Find the 65th percentile

② Find P_{25}

③ Find P_{50}

* Quartiles

There are three Quartile

① First Quartile = $Q_1 = P_{25}$

② Second Quartile = $Q_2 = P_{50} = \text{Median}$

③ Third Quartile = $Q_3 = P_{75}$

Exp:- Given the Data 12, 18, 16, 15, 20, 10

Find Q_1, Q_2, Q_3

Solution

$$Q_1 = 12$$

$$Q_2 = 15.5$$

$$Q_3 = 18$$