MEASURES OF CENTRAL TENDENCY

DESCRIPTIVE STATISTICS

prepared by:

Gyro A. Madrona
Electronics Engineer

TOPIC OUTLINE

Mean

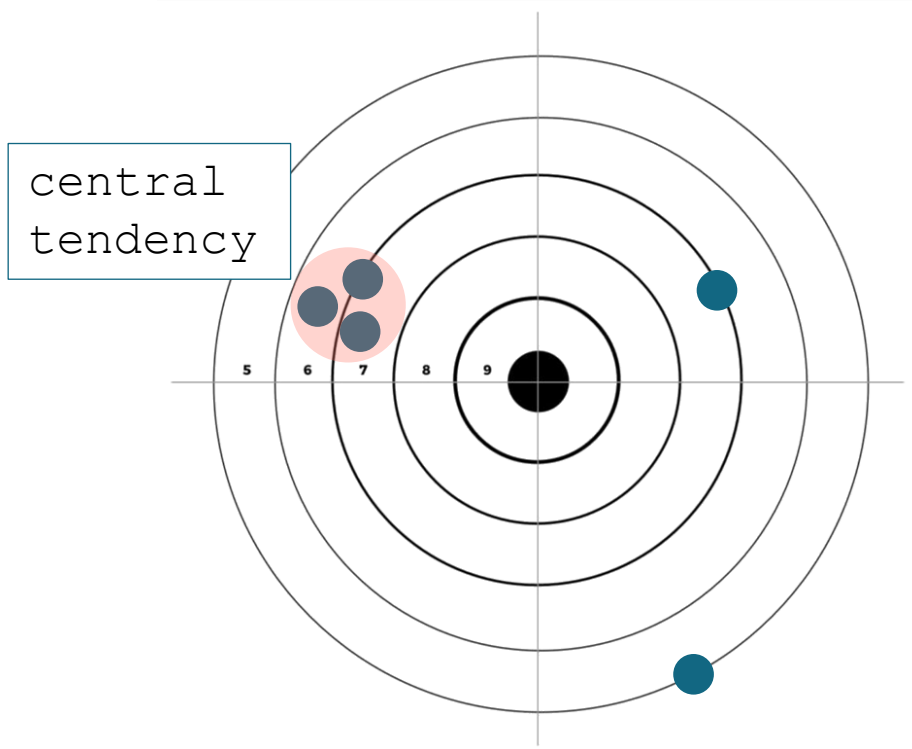
Median

Mode

MEASURES OF CENTRAL TENDENCY

MEASURES OF CENTRAL TENDENCY

Dartboard Analogy:



Measures of central tendency are used to describe the center or typical value of a dataset.

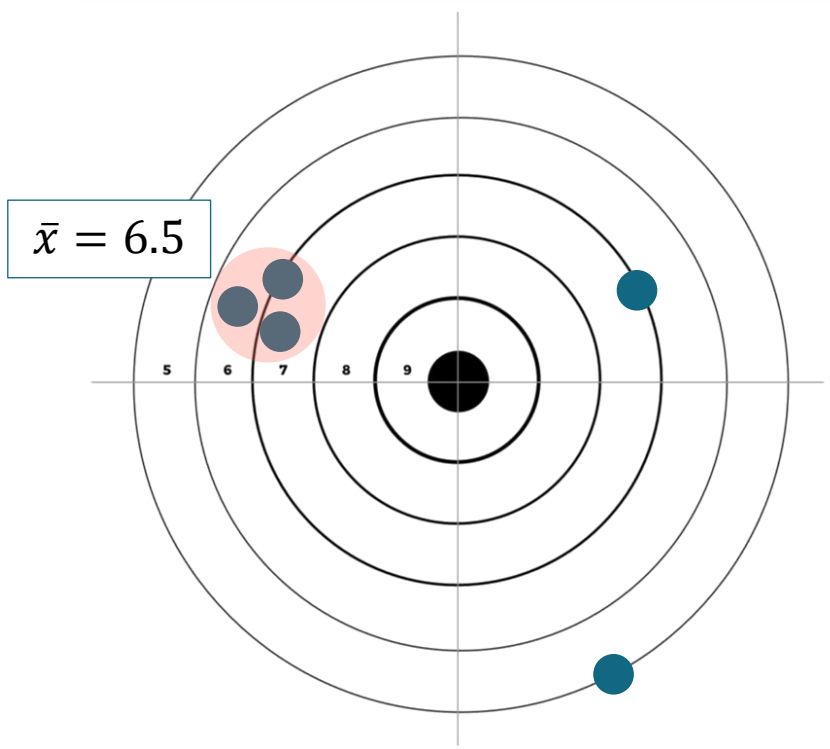
ACCURACY VS PRECISION

Accuracy refers to how close your measurements are to the **actual target** (in this case, 10).

Precision refers to how **consistent** your measurements are.

If you keep hitting 6.5 repeatedly, you have high precision but low accuracy because your results are consistent but not close to the true value (e.g., 10).

Dartboard Analogy:



MEAN

MEAN

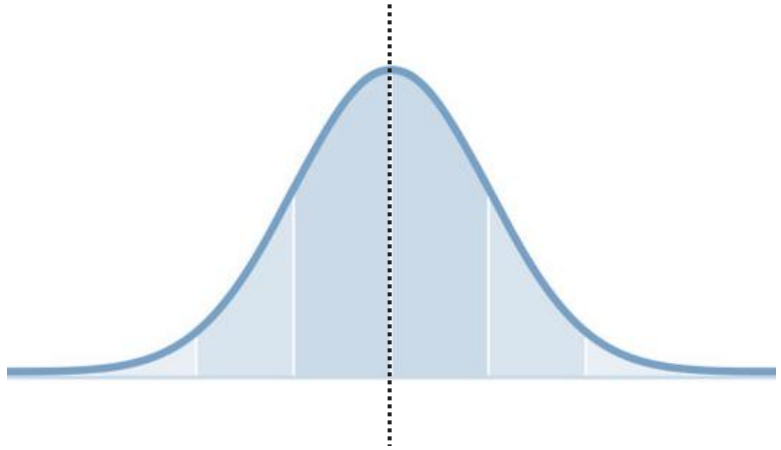
Mean ($\bar{x}$) is the arithmetic **center** of all data points (*a.k.a* "simple average").

Formula:

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i}{n}$$

where x_i represents individual data points and n is the number of observations.

Normal Distribution:



MEAN

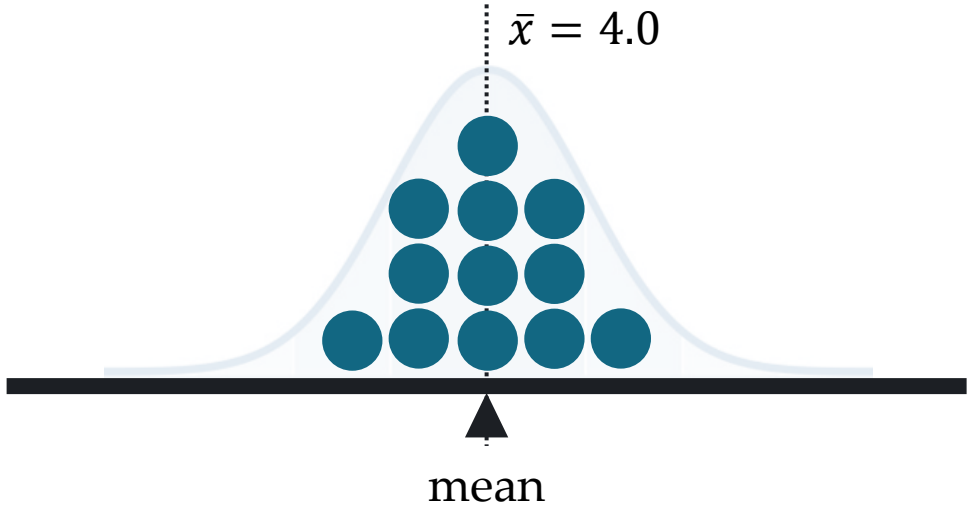
Mean ($\bar{x}$) is the arithmetic **center** of all data points (*a.k.a* "simple average").

Formula:

$$\bar{x} = \frac{\sum_{i=1}^{N} x_i}{n}$$

where x_i represents individual data points and n is the number of observations.

Center of gravity analogy:



Dataset:

2, 3, 3, 3, **4, 4, 4, 4,** 5 , 5, 5, 6

EXERCISE

The given dataset shows the prices of different fruits per kilogram in pesos. Determine the **mean** price per kilogram.

Fruit Price List

Fruit	Price
Apples	120
Bananas	60
Oranges	85
Mangoes	150
Grapes	200

Solution:

MEDIAN

MEDIAN

Median is the **midpoint** of the **ordered** dataset (i.e., ascending or descending).

Median is at position :

$$\frac{n+1}{2}$$

where n is the number of observations.

If the number of observations is even, the median is the average of the two middle numbers.

Example Dataset:

Dataset 1

Data	Ordered
5	1
2	2
1	3
4	4
3	5

Median = 3

Dataset 2

Data	Ordered
5	1
2	2
1	3
4	4
3	5
6	6

Median = 3.5

EXERCISE

The given dataset consists of voltage measurements from two different instruments. Determine the **median** voltage value for each instrument.

Solution:

Voltage Response

Measurement No.	Instrument A	Instrument B
1	12	2.8
2	5	4.5
3	9.1	6
4	3.3	9
5	24	11.7
6	18.5	14.8
7	15.2	17.3
8		20

MODE

MODE

Mode is the value that appears **most frequently** in a data set. A data set may have one mode, more than one mode, or no mode at all.

Frequency Distribution Table:

Data	Frequency

Example Dataset:

Dataset A: 1, 1, 2, 3, 4, 4, 4, 5

Dataset B: 1, 2, 3, 4, 5

EXERCISE

The given dataset records the number of points scored by a basketball player over 10 games. Determine the **mode** of the dataset.

Player Performance

Game No.	Points Scored
1	12
2	18
3	15
4	12
5	20
6	15
7	12
8	22
9	18
10	15

Solution:

Data	Frequency

LABORATORY

LABORATORY

The given dataset consists of test results from two machines, the Jaguar and Panther models, which produce 10 Ω resistors with ±5% tolerance. Determine which machine performs better based on its **measures of central tendency** for resistance values.

Resistance Test

Test No.	Jaguar	Panther
1	10.6	10.1
2	9.1	11
3	9.3	9.1
4	9.8	20
5	10.5	9.2
6	10.4	10.8
7	9.5	9.9
8	11	9.2
9	10.4	9.1
10	3	9.1
11	9.8	