

Mean:

$$\text{mean} = \frac{\sum x}{n}$$

Example:

Find the mean of

3, 5, 7, 9, 11, 13

Solution:

$$\bar{x} = \frac{3+5+7+9+11+13}{6} = \frac{48}{6} = 8$$

Median

# middle value of an ordered set.

Example 1. Find median of 2, 5, 8, 12, 15

$$\text{Median} = 8$$

Example 2: Find median of 10, 14, 18, 22, 26, 30

$$\text{Median} = \frac{18+22}{2} = \frac{40}{2} = 20$$

Mode

most frequent value of the dataset.

Example : Find Mode of 3, 6, 9, 9, 12, 15

$$\text{Mode} = 9$$



Distributions.

1. Normal Distribution.

It is a continuous probability distribution.  
called bell curved.

$$Z \text{ score formula} \quad Z = \frac{x - \mu}{\sigma}$$

$x \rightarrow$  given value

$\mu \rightarrow$  mean

$\sigma \rightarrow$  standard Deviation.

Example :

The heights of students follow a normal distribution with mean  $\mu = 170$  cm & standard deviation  $\sigma = 6$  cm.

Find the probability that a randomly selected student is taller than 175 cm.

Solution:

calculate z-score

$$z = \frac{x - \mu}{\sigma} = \frac{175 - 170}{6} = 0.833$$

Using a z-table, the probability for  $z = 0.83$  is 0.7967

Since we need taller than 175 cm, we take

$$P(X > 175) = 1 - 0.7967 = 0.2033$$

The probability is 20.33 %.

## 2 Binomial Distribution

The Binomial Distribution models the number of successes in  $n$  independent trials, of a binary event.

$$P(X=k) = \binom{n}{k} p^k (1-p)^{n-k}$$

Example:

A multiple choice Quiz has 10 questions, each with 4 choices. A student guesses every answer. What is the probability of getting exactly 3 correct answers?

$$P(X=3) = \binom{10}{3} (0.25)^3 (0.75)^7$$

$$= 0.2503$$

The probability is 25%.

### 3. Poisson Distribution.

The Poisson Distribution models the no of events occurring in a fixed interval when events happen independently at a constant avg rate.

$$P(X=k) = \frac{e^{-\lambda} \lambda^k}{k!}$$

Example: A call center receives 5 calls per hour. What is the probability of receiving exactly 3 calls per hour.

$$\lambda = 5, k = 3$$

$$P(X=3) = \frac{e^{-5} \cdot (5)^3}{3!} = 0.1404$$

The probability of exactly 3 calls

is 14%  
=

## 4) Uniform Distribution.

A Uniform Distribution assigns equal probability to all outcomes in a given Range

Formula:

$$P(a \leq X \leq b) = \frac{b-a}{\text{Range}}$$

Example:

A factory machine produces bolts 1cm to 5cm in length. Find the probability of a bolt being less than 2.

$$a=1, b=2, \text{ Range} = 4 \rightarrow (5-1)$$

$$P(1 \leq X \leq 2) = \frac{2-1}{4} = \frac{1}{4} = 0.25$$

25% probability.