

# Mean, Median & Mode

Group No.: 9

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- 251133107004
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# Mean, Median & Mode

# Purpose of Learning

- To understand central tendency of data      → Learn formulas for quick calculation
- Essential for GTU exams and practicals      → Helps in summarizing large datasets

# Introduction

Central tendency = value that represents the dataset

Three main measures:

- Mean
- Median
- Mode

Each has its own formula depending on data type



# Main Content Overview

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Mean formulas

02

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Median formulas

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Mode formulas

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Grouped vs Ungrouped data

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Applications

# Mean (Ungrouped Data)

Formula (Discrete / Individual Values):

$$\bar{x} = \frac{\sum x_i}{n}$$

Where:

- $\bar{X}$  = sample mean
- $x_i$  = each observation
- $n$  = total number of observations



# Mean (Grouped Data)

Formula (Frequency Table):

$$Mean(\bar{X}) = \frac{\sum f_i X_i}{\sum f_i}$$

Where:

- $f_i$  = frequency of class
- $X_i$  = class midpoint





# Median (Grouped Data)

Formula:

$$\text{Median} = L + \frac{\frac{N}{2} - CF}{f} \times h$$

Where:

- $L$  = lower boundary of median class
- $N$  = total frequency
- $CF$  = cumulative frequency before median class
- $f$  = frequency of median class
- $h$  = class width



# Mode (Ungrouped Data)

Formula:

- Mode = Value which occurs most frequently
- No calculation needed for individual values

# Mode (Grouped Data)

Formula (Using Table):

$$\text{Mode} = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

Where:

- $L$  = lower boundary of modal class
- $f_1$  = frequency of modal class
- $f_0$  = frequency of previous class
- $f_2$  = frequency of next class
- $h$  = class width



# Mean, Median, Mode – Summary Formulas

Mean

$$\bar{X} = \frac{\sum X_i}{N}$$

$$\bar{X} = \frac{\sum f_i X_i}{\sum f_i}$$

Median

Middle value (ordered data)

$$Median = L + \frac{\frac{N}{2} - CF}{f} \times h$$

Mode

Most frequent value

$$Mode = L + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

This table provides a quick reference for calculating central tendencies based on whether your data is ungrouped (individual observations) or grouped (frequency distribution).

# Important Notes on Data Types

## Ungrouped Data

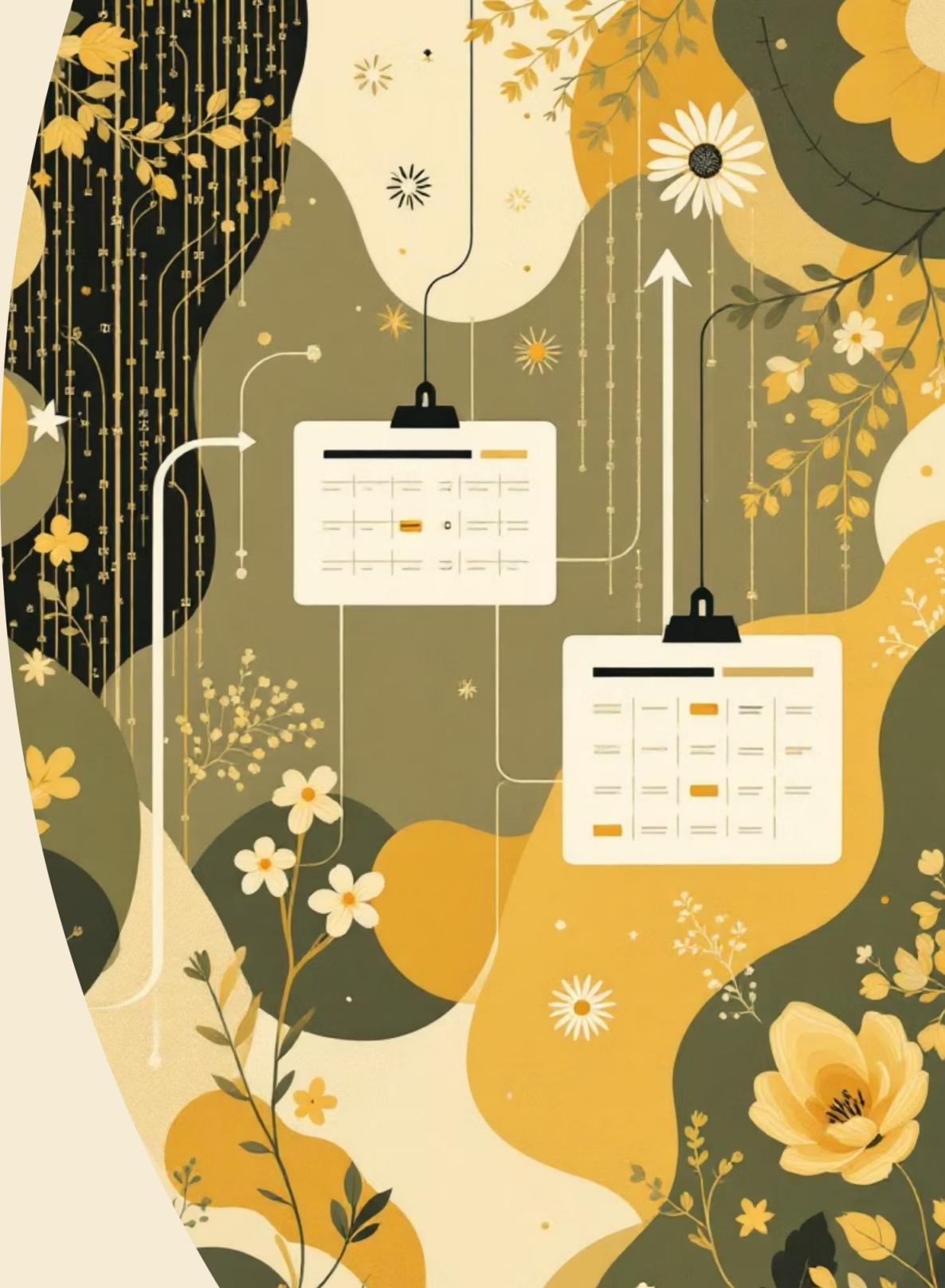
Refers to raw, individual observations that have not been organized into any classes or frequency distributions.

## Grouped Data

Data that has been organized into a frequency distribution, typically involving class intervals and their corresponding frequencies.

## Formula Selection

Always ensure you use the correct formula based on whether you are working with ungrouped or grouped data for accurate calculations.



# Symbols Used

$X_i$	Individual data values or class midpoints
$f_i$	Frequency of a particular class or observation
$N$	Total number of observations or total frequency
$L$	Lower boundary of the median or modal class
$h$	Class width or size of the class interval
$CF$	Cumulative frequency of the class preceding the median class

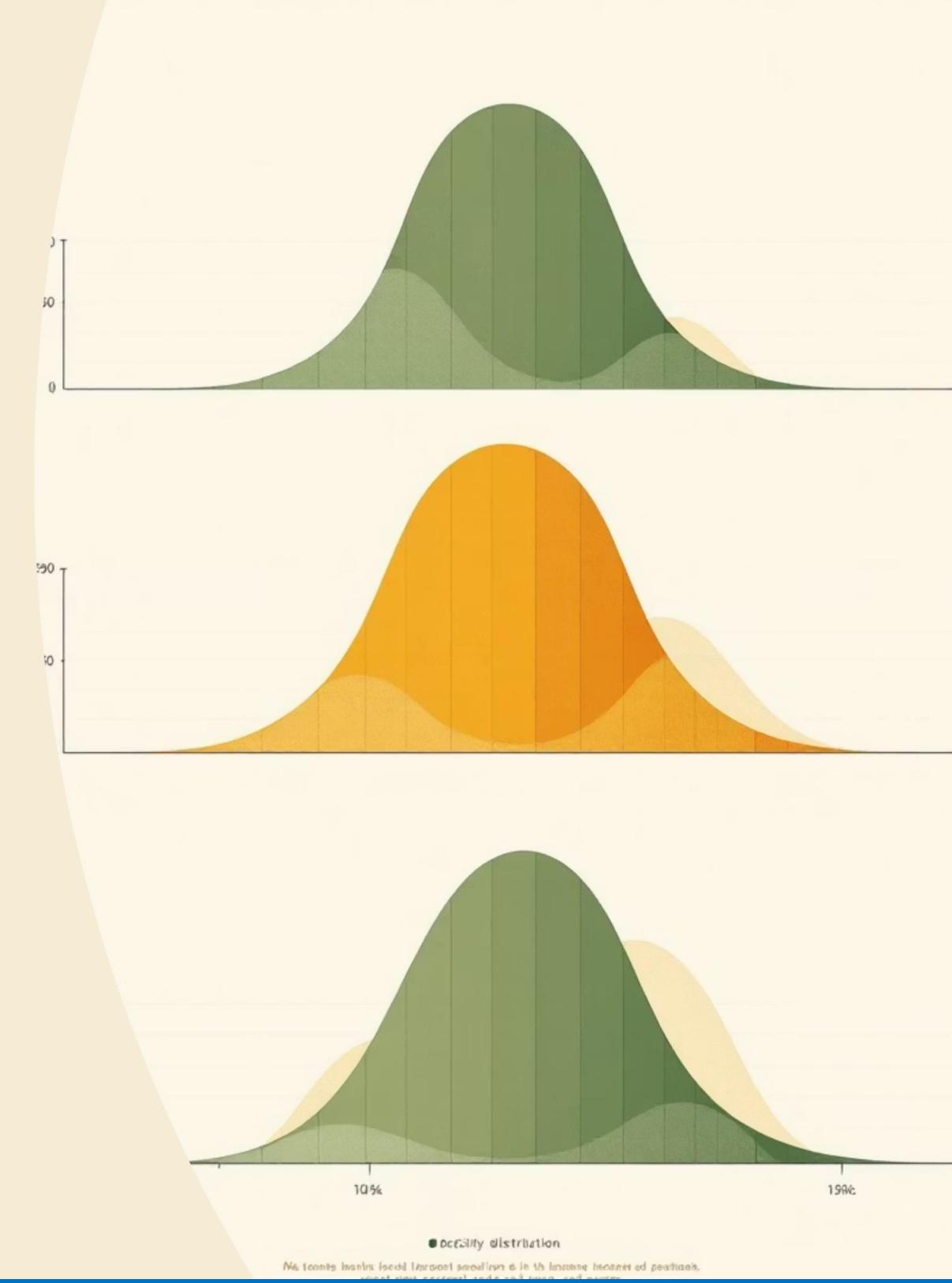
This slide clarifies the meaning of each symbol used in the formulas for calculating mean, median, and mode, ensuring consistent understanding throughout the presentation.

# Central Tendency Relationships

Mean, median, and mode are fundamental measures used to describe the **center of a dataset**.

For **symmetric data**, where the data is evenly distributed around its center, the **Mean = Median = Mode**.

For **skewed data**, where the data distribution is asymmetrical, the **Mean  $\neq$  Median  $\neq$  Mode**. The direction of the skew (positive or negative) determines their relative order.





# Advantages of Using Formulas

Leveraging standardized formulas offers several key benefits in the study and application of statistics.

## Quick Calculation

Formulas streamline complex computations, enabling faster and more efficient data analysis, especially for large datasets.

## Useful in Exams

Mastering these formulas is crucial for success in academic assessments, as they provide a direct method for solving statistical problems.

## Applicable to Large Datasets

Formulas allow for systematic processing of extensive data collections, making it feasible to derive central tendencies from vast amounts of information.

## Standardized Method in GTU Syllabus

These specific formulas align with the Gujarat Technological University (GTU) curriculum, ensuring consistency and accuracy in statistical coursework.

# Applications in GTU Exams



## Solve Theory Questions

Formulas are essential for understanding and answering theoretical questions related to central tendency in exams.



## Fill Numerical Tables

Accurate application of formulas is critical for completing numerical tables and frequency distributions in problem-solving scenarios.



## Determine Central Values

Practical application extends to laboratory and practical sessions, where you'll use these formulas to analyze experimental data.



## Frequently Asked

Concepts and formulas for Mean, Median, and Mode are recurring topics, making them crucial for success in Semester 3 examinations.





# Additional Notes

Keep these critical considerations in mind when applying the formulas for median and mode to ensure accuracy in your statistical analysis.

## Arrange Data for Median

Always sort the data in ascending or descending order before attempting to find the median. This is crucial for correctly identifying the middle value.

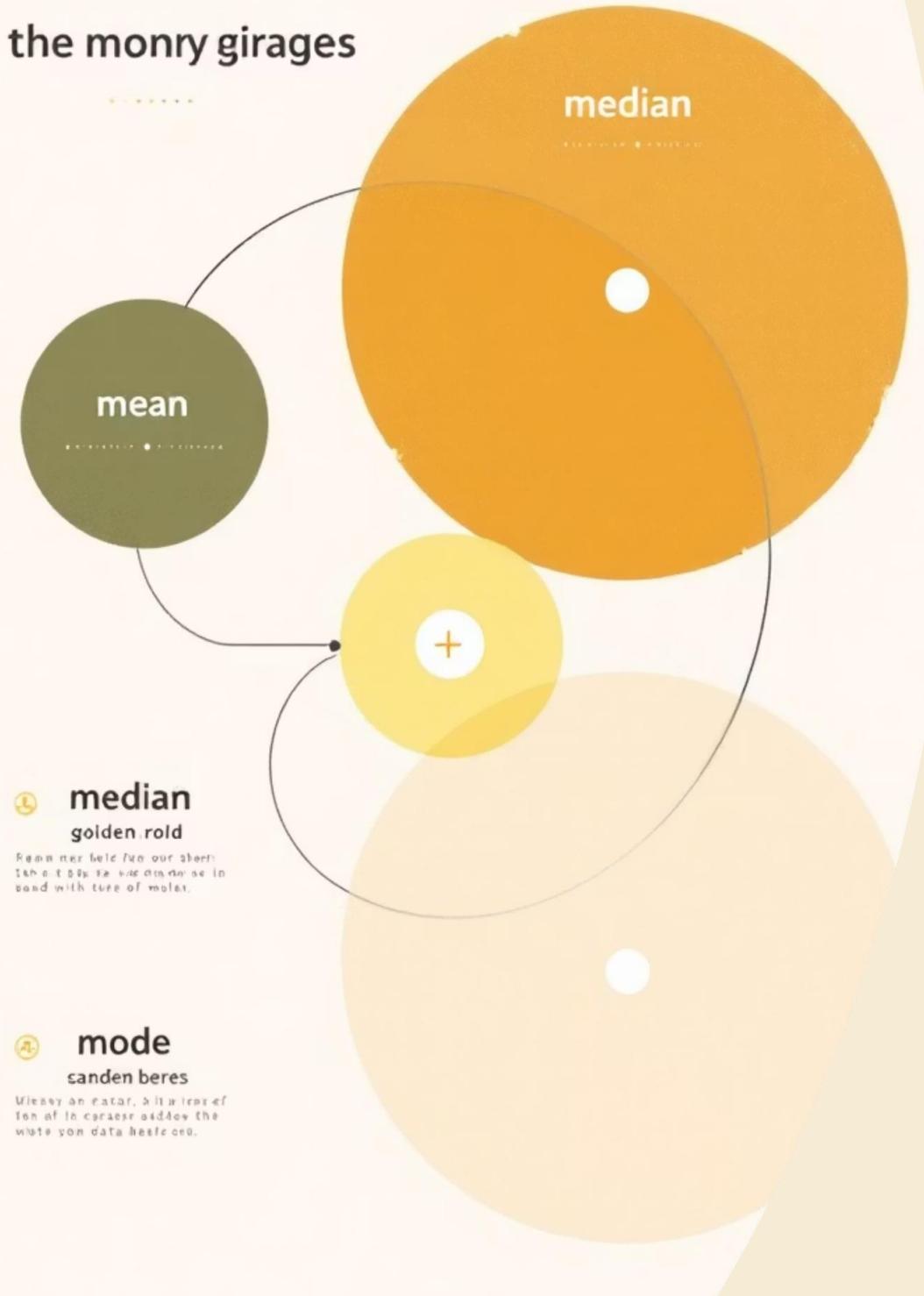
## Identify Modal Class

For grouped data, correctly identify the modal class (the class with the highest frequency) before applying the mode formula. This is the first step to accurate calculation.

## Check Class Width

Ensure consistent class widths ( $h$ ) throughout your grouped data. Inconsistent widths can lead to errors in both median and mode calculations.

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# Summary of Central Tendencies



# Mean

The average value of a dataset, calculated by summing all observations and dividing by the total count.



## Median

The middle value in an ordered dataset, effectively dividing the data into two equal halves.



## Mode

Remember to select the appropriate formula based on whether your data is **grouped** (frequency distribution) or **ungrouped** (individual values) to ensure accuracy in your statistical analysis.

# Conclusion

## 1 Key Measures of Central Tendency

Mean, Median, and Mode are fundamental statistical measures that help locate the center of a dataset, providing a concise summary of data distribution.

## 2 Efficient Data Summarization

These measures are crucial for efficiently summarizing and interpreting large datasets, simplifying complex information into actionable insights.

## 3 Formula Selection is Crucial

Always apply the appropriate formula: ungrouped for raw, individual data points and grouped for data organized into frequency tables or class intervals.

## 4 Data Type and Distribution Dictate Choice

The correct measure to use depends heavily on the nature of your data (e.g., nominal, ordinal, interval, ratio) and its distribution (symmetric or skewed).

## 5 Essential for Academic & Real-World Use

Mastery of these concepts and formulas is vital for success in GTU examinations, practical applications, and solving real-life statistical problems.



# References

Here are the key resources used and recommended for further study in Probability & Statistics.



**GTU Reference Material**

Probability & Statistics



**R.S. Aggarwal**

Statistics



**SC Gupta & VK Kapoor**

Fundamentals of Mathematical  
Statistics

# Thank You

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For: GTU Semester 3 – Probability & Statistics

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