2.Take one Domain and draw the graph (Normal distribution) (Empirical rule)

In statistics, many real-world data sets follow a Normal Distribution, also called a Gaussian Distribution. It is a continuous probability distribution that is symmetric around the mean. This means most of the values cluster around the average, and fewer values appear as we move away from the center.

Domain:

The domain selected is Student Exam Scores, which commonly follow a Normal Distribution. A normal distribution is a symmetric, bell-shaped curve where most values cluster around the average, and fewer values appear at the extremes.

In exam results, the majority of students score near the mean (average marks), while only a few students score very low or very high marks. This makes student performance a suitable realworld example of a normal distribution.

According to the Empirical Rule (68–95–99.7 rule):

- About 68% of students score within one standard deviation of the mean.
- About 95% of students fall within two standard deviations.
- Nearly 99.7% of students fall within three standard deviations.

This rule helps teachers understand overall performance and identify outliers such as toppers or weak performers.

The distribution can also be represented using:

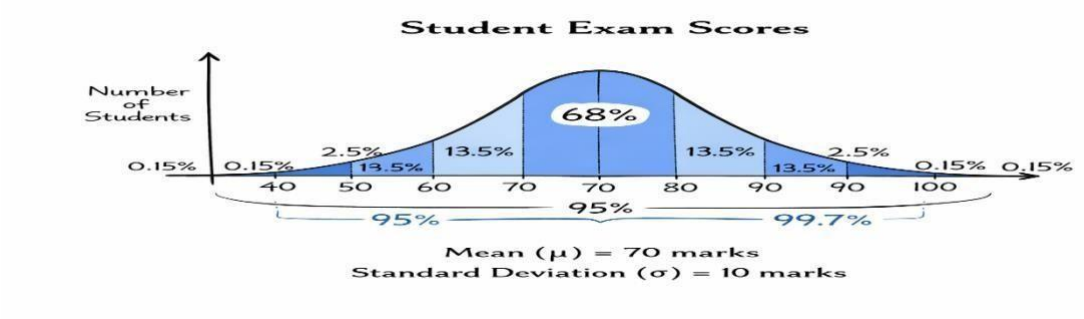
- Histogram – shows frequency of marks
- Normal curve – shows smooth bell shape
- Skewed distributions – show easier or harder exams
- Mean, Median, Mode comparison – shows data symmetry

Understanding this distribution helps in grading systems, performance analysis, and academic decision-making.

We will assume:

- Mean (μ) = 70 marks
- Standard Deviation (σ) = 10 marks

This is a common real-world domain where data follows a Normal Distribution (Bell Curve).



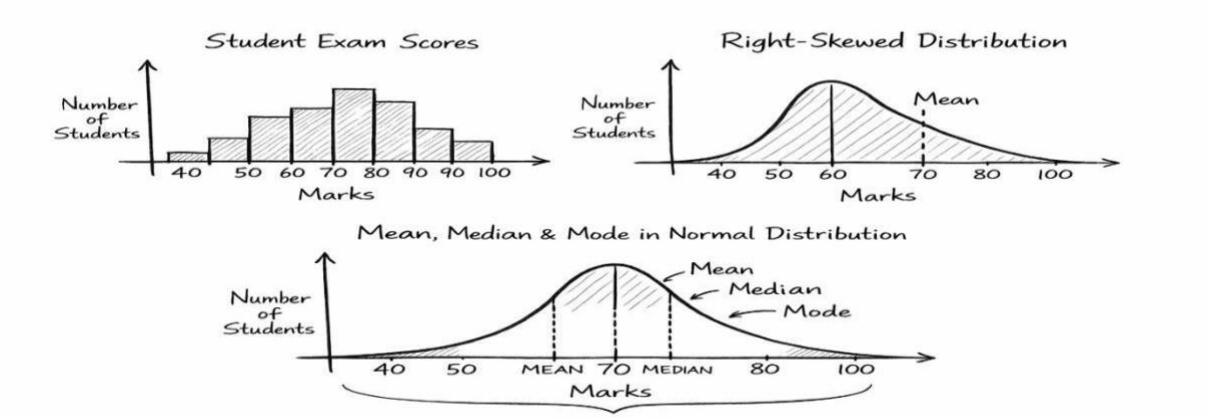
Normal Distribution Graph Explanation

The graph is a bell-shaped curve with:

- Center = Mean (70)
- Spread determined by standard deviation

Axis:

- **X-axis** → Marks
- **Y-axis** → Number of Students (Frequency)



Empirical Rule (68–95–99.7 Rule)

This rule explains how data is distributed in a normal curve.

1 Standard Deviation (μ ± 1σ)

- Range: 60 to 80
- Covers: 68% of students

➞ Most students score between 60–80 marks.

2 Standard Deviations (μ ± 2σ)

- Range: 50 to 90

- Covers: 95% of students

➞ Almost all students fall in this range.

3 Standard Deviations ($\mu \pm 3\sigma$)

- Range: 40 to 100
- Covers: 99.7% of students

➞ Very few students score below 40 or above 100.

Range	Marks	Percentage
$\mu \pm 1\sigma$	60–80	68%
$\mu \pm 2\sigma$	50–90	95%
$\mu \pm 3\sigma$	40–100	99.7%

Conclusion

student exam scores follow a normal distribution where most values lie near the mean. The empirical rule helps understand how marks are spread across standard deviations. This is useful for analysing student performance and identifying exceptional cases.

In the domain of Student Exam Scores, the Normal Distribution helps us understand how marks are spread around the average. Using the Empirical Rule (68–95–99.7), we can clearly predict how many students fall within certain score ranges.

The majority of students perform near the mean, while extreme scores are rare. This makes the Normal Distribution a powerful tool for academic performance analysis and decision-making.

Moreover, the normal distribution helps reduce bias in decision-making. Instead of judging individual scores emotionally, institutions can rely on statistical evidence. It also helps in comparing different classes or batches fairly.

In conclusion, the Normal Distribution and Empirical Rule are powerful tools for analyzing student performance. They provide structured insights into how marks are distributed, help in making academic decisions, and ensure fairness and accuracy in evaluation systems. This

makes normal distribution one of the most important statistical concepts in the education domain.