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

Domain:

The selected domain is Student Examination Performance. In most academic institutions, student marks tend to follow a Normal Distribution pattern. This means that most students achieve average scores, while only a small number score extremely high or extremely low.

A normal distribution forms a bell-shaped curve that is perfectly symmetrical around the mean (average). This symmetry indicates balanced performance in the class.

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

- Nearly 68% of students obtain marks that lie within one standard deviation from the average score.
- Around 95% of students score within two standard deviations from the mean.
- Approximately 99.7% of students fall within three standard deviations of the mean value.

This principle allows teachers to clearly observe how student marks are distributed. It helps in recognizing exceptional performers (very high scorers) as well as students who may need additional support (very low scorers).

Student performance data can be displayed in several forms, such as:

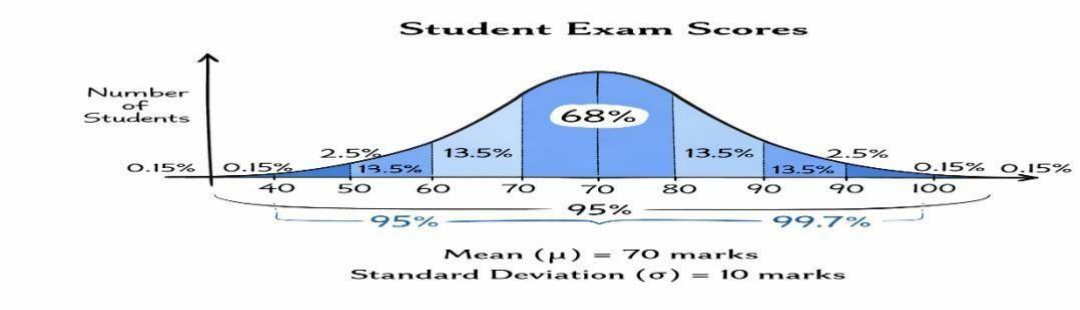
- Histogram – illustrates how frequently different mark ranges occur.
- Normal Curve – represents the smooth, symmetrical bell-shaped pattern of distribution.
- Skewed Graphs – indicate whether an exam was comparatively easy or difficult.
- Comparison of Mean, Median, and Mode – helps determine whether the data is balanced or shifted.

Analysing exam results using normal distribution assists in designing grading criteria, evaluating overall class performance, and making fair academic decisions.

For this example, we consider:

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

Student exam results are a practical real-world example where data commonly follows a Normal Distribution (Bell-Shaped Curve) pattern.



Normal Distribution Graph Description

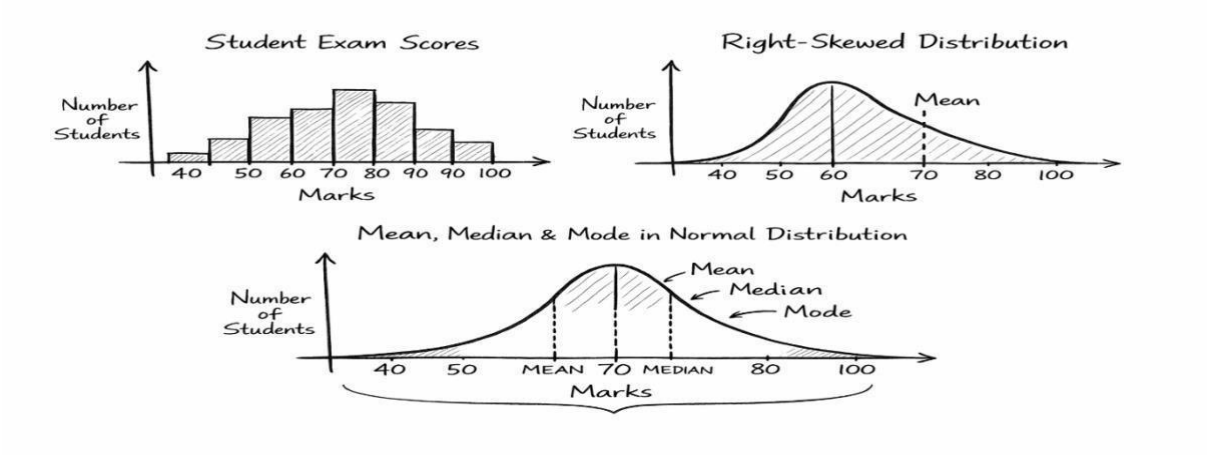
The diagram displays a symmetrical bell-shaped curve that represents how the data is distributed.

- The midpoint of the curve indicates the average value (Mean = 70).
- The width of the curve depends on the standard deviation, which shows how much the marks vary from the mean.

A smaller standard deviation makes the curve narrow and steep, while a larger standard deviation makes it wider and flatter.

Axis:

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



Empirical Rule (68–95–99.7 Principle)

The Empirical Rule describes how values are spread around the mean in a normal distribution.

Within One Standard Deviation ($\mu \pm 1\sigma$)

- Marks lie between 60 and 80.
- About 68% of students fall in this interval.

This means the majority of students achieve scores close to the average.

Within Two Standard Deviations ($\mu \pm 2\sigma$)

- Marks range from 50 to 90.
- Nearly 95% of students are included in this range.

This indicates that almost the entire class performs within these limits.

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

- Marks extend from 40 to 100.
- Approximately 99.7% of students are covered.

This shows that only a very small number of students score outside this range.

➞ 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.