

# Understanding Standard Deviation: A Complete Visual Guide

Your Name/Department

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## Introduction to Standard Deviation

Standard deviation ( $\sigma$ ) measures how spread out numbers are in a dataset. Key points:

- Small  $\sigma$  = Values cluster close to the mean
- Large  $\sigma$  = Values are more spread out
- Crucial for understanding data variability and reliability

## Part 1: Comparing Two Classes

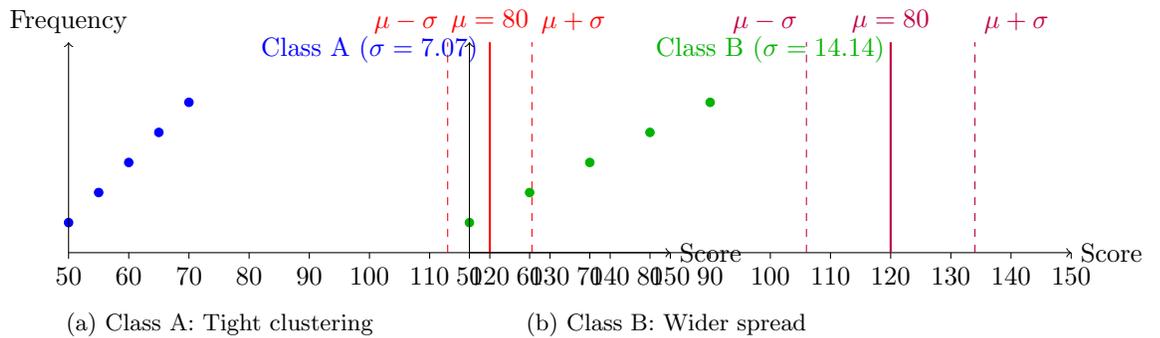


Figure 1: Comparing two classes with same mean but different standard deviations

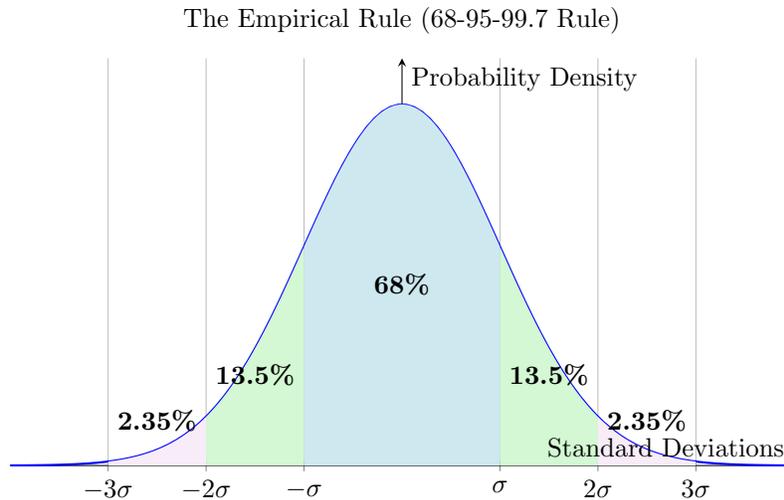


Figure 2: Normal distribution showing percentage of data within different standard deviation ranges

## Part 2: Normal Distribution Visualization

### Key Insights

- **Class Comparison:**
  - Both classes have mean = 80
  - Class A's scores are closer together (small  $\sigma$ )
  - Class B's scores are more spread out (large  $\sigma$ )
- **Empirical Rule:**
  - 68% within  $\mu \pm \sigma$
  - 95% within  $\mu \pm 2\sigma$
  - 99.7% within  $\mu \pm 3\sigma$
- **Practical Applications:**
  - Identifying outliers
  - Comparing group variability
  - Understanding measurement precision