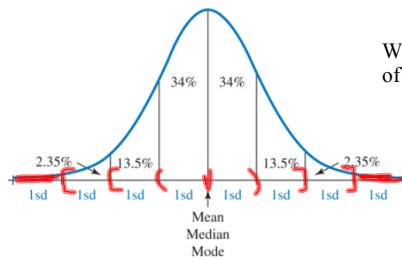


Data sets that generate a curve with this bell shape are often referred to as being **normally distributed**. The graph is called a **normal curve**.



Where is the middle 95% of the dataset?

Figure 11 A normal distribution showing the measures of center and the percents in various parts of the distribution

Think About...

If a normally distributed data set contained 2000 data points, how many of these points would you expect to differ from the mean by more than three standard deviations?

$$100\% - 99.7\% = 0.3\%$$

$$.003 \times 2000 = 6 \text{ data points}$$

Suppose we consider the scores on three forms of a math placement test, each form given to a large group of students. The scores on each form are normally distributed. On Test Form 1 the mean is 66 and the standard deviation is 4; on Test Form 2 the mean is 66 and the standard deviation is 2; and on Test Form 3 the mean is 72 and the standard deviation is 6. If we graph all three sets of test scores on the same axis, we get the graph in Figure 12.

DISCUSSION 9 Understanding the Normal Distribution

- How can you tell from the graphs of the test scores which test has the greatest standard deviation?
- Which curve in Figure 12 represents which test form? How do you know?

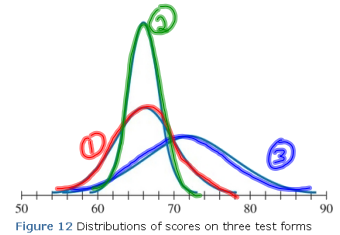
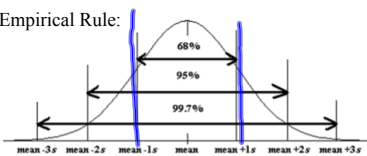


Figure 12 Distributions of scores on three test forms

Empirical Rule:



Confidence Intervals:

A 95% confidence interval is a range of values between which approximately 95% of samples of the given size would be expected to fall.

In practice, we usually only collect *one* sample and use a confidence interval to estimate where the population parameter is likely to fall.

Example: Suppose in a survey of 100 people, 44% intend to vote for a school referendum.

- What is the margin of error based on the rule of thumb we learned yesterday? What is the confidence interval based on our 'rule of thumb', where the true proportion is highly likely to be?

margin of error: $\frac{1}{\sqrt{100}} = \frac{1}{10} = 10\%$

The confidence interval $(44 - 10\%, 44 + 10\%) = (34\%, 54\%)$

- Based on *this* information, is it safe to conclude the referendum will fail? **No (50% is in the confidence interval).**

