



Problem 1 – Fitting data to a Normal Curve

Create a histogram of this data on page 1.5 with *success* as the X variable.

Calculate the mean and standard deviation of the data list *success* using cells C2 and C4. Then plot the mean on the histogram using the **Plot Value** tool from the **Analyze** menu.

- What do you notice about the data and the vertical line positioned at the mean?

Set the width of the intervals of the histogram to one standard deviation by selecting **Bin Settings** and setting the width equal to standard deviation and the alignment equal to the mean.

Click on the bars and sum the counts to answer the following:

- How many data points are within 1 standard deviation of the mean? What percent of the total number of data points is that?
- How many are within 2 standard deviations? What percent is that?
- What about 3 standard deviations?

Reset the window using **Zoom - Data** and use the **Show Normal PDF** from the **Analyze** menu. The curve now displayed is called a normal curve, and it is used to approximate binomial distributions for a large number of trials.

Problem 2 – Exploring the Normal Curve

Drag the sliders for mean and standard deviation on page 2.3.

- What effect does each have upon the shape and position of the curve?

Place a point on the curve and drag it to the curve's maximum. What do you notice?

Drop a Perpendicular from this point to the x-axis.

- What does the line $x = m$ appear to do to the curve?
- Change the values of the mean and/or standard deviation and repeat to see if you get the same results.



Clear the point and line from the diagram. Select the **Integral** tool, to measure the area between the curve and the axis.

- What do you observe about this area?

- What happens to the area as you change m or sd ?

Problem 3 – Exploring the Normal Curve

The normal curve on page 3.2 is divided vertically by dashed lines whose width is each one standard deviation. Drag the sliders for mean and standard deviation.

- What effect does each have upon the shape and position of the curve?

Use the sliders to set m at 500 and sd at 90.

Select **Integral** from the **Measurement** menu and click on the curve. Then click on the two points (from left to right) that are 1 standard deviation away from the mean. Drag the result to the appropriate label. Do the same for the points that are 2 and 3 standard deviations from the mean.

- With the three measurements displayed, change the value of the standard deviation. What do you observe?

Return once more to the histogram on page 1.5.

- Does the empirical rule make sense in this context?

- Use the empirical rule to determine how many data points are within 1 standard deviation of the mean?

- Use the empirical rule to determine how many are within 2 standard deviations?

- Use the empirical rule to determine how many data points are within 3 standard deviations

How do these answers compare with those you found earlier?