

**Practice Run**

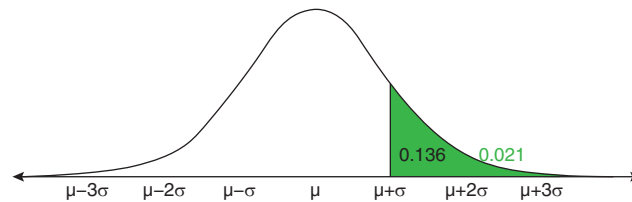
1. What percentage of data will lie between $\mu + \sigma$ and $\mu + 3\sigma$ in a normal distribution?
2. Determine the mean value of a data set that is normally distributed if the same amount of data lies below 71 as lies above 87.
3. A company is manufacturing sprockets with a mean size of 812.00 mm and a standard deviation of 0.15 mm.
 - a. If sprockets smaller than 811.55 and larger than 812.15 are rejected, what percentage of the company's sprockets will be rejected?
 - b. Describe how the standard deviation would need to change so fewer sprockets are rejected. What does this mean in terms of the manufacturing process?



Compare your answers.

- What percentage of data will lie between $\mu + \sigma$ and $\mu + 3\sigma$ in a normal distribution?

Begin by sketching a diagram to represent the problem. The points are one standard deviation above the mean and three standard deviations above the mean. Look up the necessary areas.

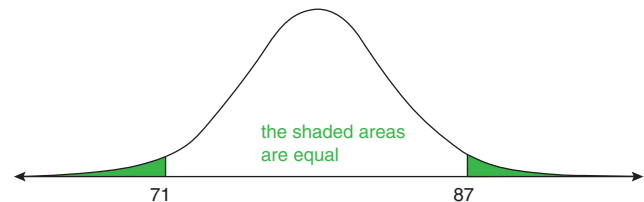


$$0.136 + 0.021 = 0.157$$

So, 15.7% of data lies between $\mu + \sigma$ and $\mu + 3\sigma$.

- Determine the mean value of a data set that is normally distributed if the same amount of data lies below 71 as lies above 87.

The normal distribution is symmetrical so if the same amount of data lies below 71 as lies above 87, the mean will need to be halfway between 71 and 87.

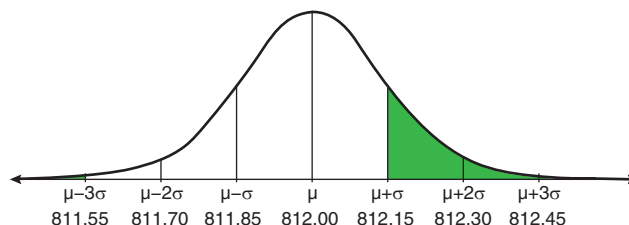


$$\mu = \frac{71 + 87}{2}$$

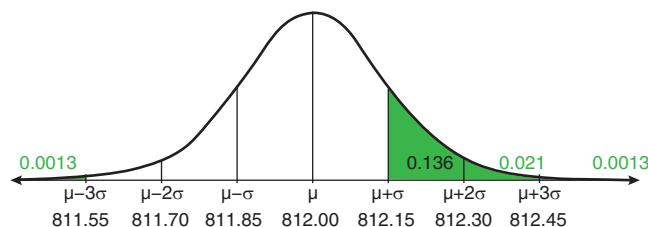
$$\mu = 79$$

3. A company is manufacturing sprockets with a mean size of 812.00 mm and a standard deviation of 0.15 mm.
- a. If sprockets smaller than 811.55 and larger than 812.15 are rejected, what percentage of the company's sprockets will be rejected?

Begin by sketching a diagram to represent the problem.



Look up the area for each of the included regions.

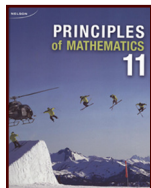


$$0.0013 + 0.136 + 0.021 + 0.0013 = 0.1596$$

So, approximately 16% of the company's sprockets will be rejected.

- b. Describe how the standard deviation would need to change so fewer sprockets are rejected. What does this mean in terms of the manufacturing process?

A lower standard deviation would mean the data is clustered more closely around the mean and so fewer sprockets would be rejected. This means the manufacturing process would need to be more consistent to make more sprockets closer to 812.00 mm.



For further information about normal distributions see pp. 269 – 278 of *Principles of Mathematics 11*.

So far you have learned how to determine the area under a normal curve between data values that are a whole number of standard deviations from the mean. In the next lesson you will learn how to determine the area under a normal curve between any two data values.