

Identifying Skew With Measures of Center

by Sophia



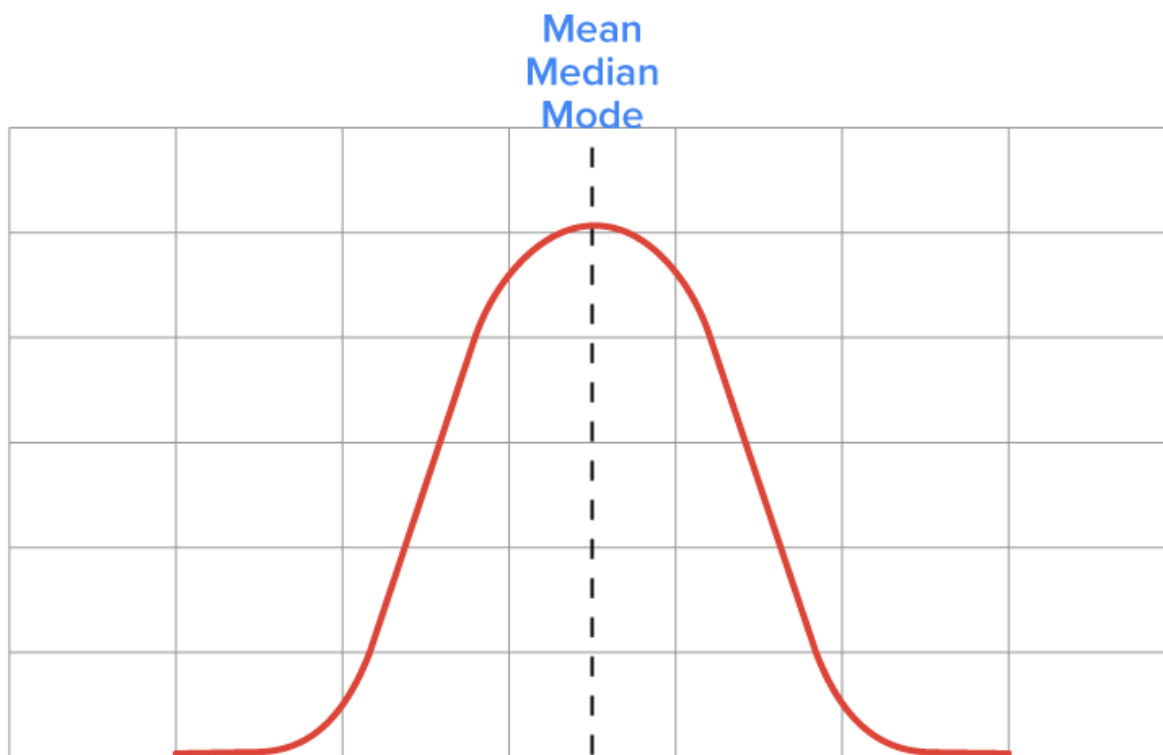
WHAT'S COVERED

This lesson discusses identifying skewness with measures of center. By the end of the lesson, you should be able to identify the relationship between mean, median, and mode on a skewed distribution, and be able to use these measures of center to identify skew. Specifically, this lesson covers:

1. [Measures of Center and Skew](#)
2. [Identifying Skew Using Measures of Center](#)

1. Measures of Center and Skew

What can measures of center tell us about the skew of data? Look at this graph, which shows a normal distribution. It's symmetrical. The mean, median, and mode are identical. Therefore, for data with little or no skew, all three measures of center will be equal.

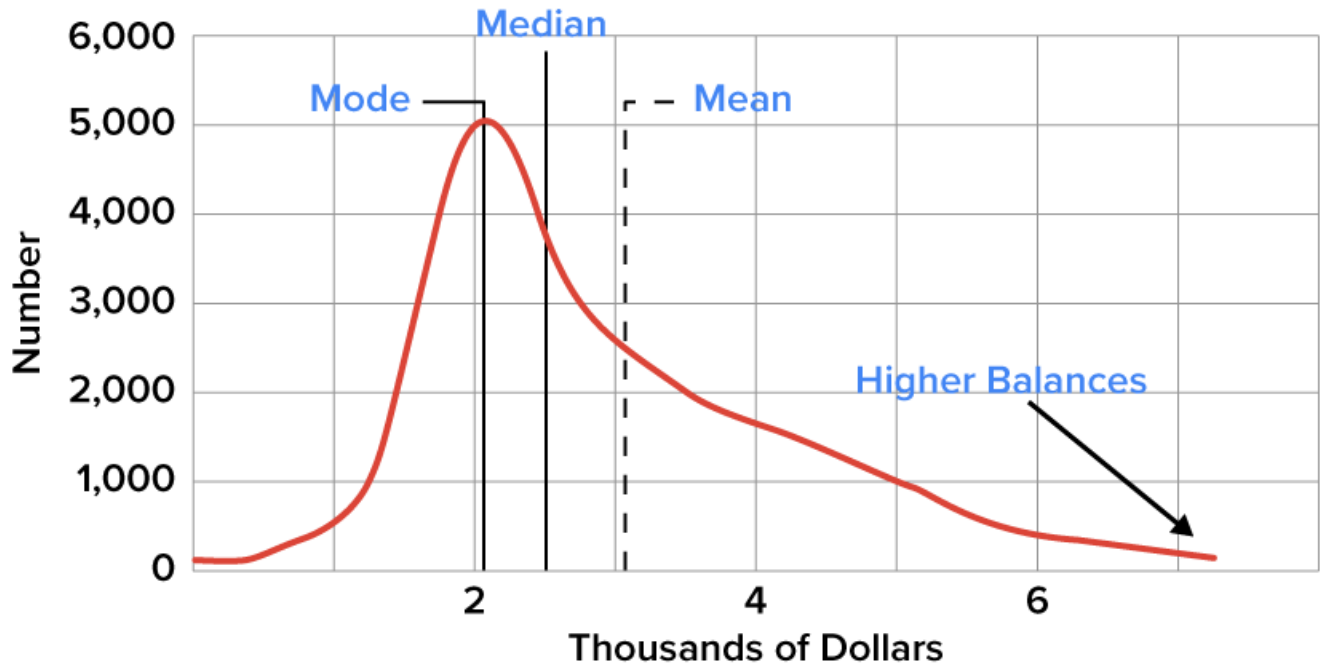


BIG IDEA

For a normal distribution, $\text{mean} = \text{median} = \text{mode}$. This will also be roughly true for real data with little or no skew.

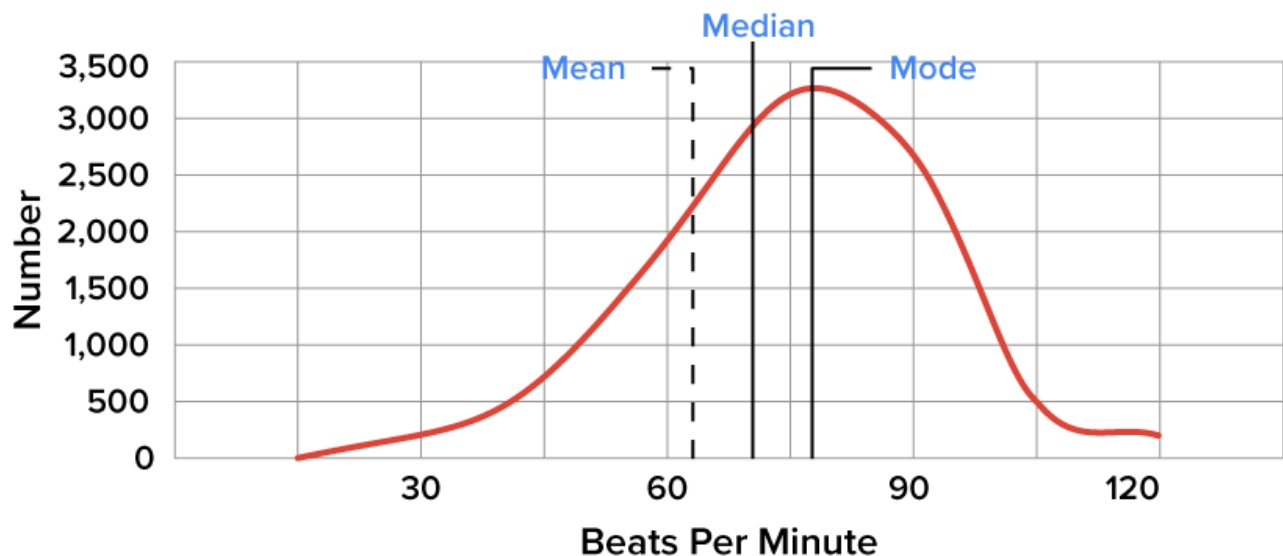
Bank account balances are an example of a right-skewed distribution. A few people have quite a bit of money in their bank account, but many more don't. In this situation, the mode and the median are going to be relatively low, and the mean is going to be higher. That's simply because a small number of large balances pull up the mean.

Bank Account Balances



For an example of a left-skewed distribution, look at the heart rate of a sample of people. You're going to see the heart rate measured in beats per minute, and the mean beats per minute is probably somewhere around the 70 or 80 mark. You will see some beats that are higher or lower than that. However, there will be relatively few people with a low heart rate. That's going to bring you to a situation reflected by a left-skewed distribution.

Heart Rate



IN CONTEXT

When Bill Gates (or choose your favorite billionaire) sits at a cafe, the average (mean) customer instantly becomes a billionaire!

This case illustrates how the mean can be very misleading. In the case of the mean, a few extreme observations (outliers) can have a big effect. The median and the mode, however, would change very little.

2. Identifying Skew Using Measures of Center



THINK ABOUT IT

How can you tell if a distribution is going to be skewed one way or the other?

You can look at a graph, but you can also look at the mean, median, and mode.

- If the mean is greater than the median and the mode, it is a right-skewed distribution.
- If the mean is equal to the median and the mode, it's a normal distribution.
- If the mean is less than the median and the mode, it is a left-skewed distribution.

Situation	Skew
Mean > Median	Right
Mean > Mode	Right
Mean = Median	Normal
Mean = Mode	Normal
Mean < Median	Left
Mean < Mode	Left



TRY IT

What type of skew would you expect from the following data sets?

Life span (age at death) for people in a developed country



A small number of people might live short lives due to illness or accident, but with good healthcare, most can expect to live into their 60s or 70s, and very few would live past 100. In this case, the mean would be reduced by outliers with shorter lives, but the median would change less (mean < median). This data would be left-skewed.

In the United States, most workers live less than 30 miles from work, but a few may commute a longer distance. In this case, the mean would be increased by those with relatively longer commutes, but the median and mode would be less affected (mean > median and mode). This data would be right-skewed.



SUMMARY

In this lesson, you learned that symmetrical distributions have roughly equal values for mean, median, and mode. You learned to **identify skewed data with measures of center**. Considering the relationship between **measures of center and skew**, right-skewed data has a mean that is larger than the median and mode, and left-skewed data has a mean that is smaller than the median and mode.

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