

3.E: Measures of Central Tendency and Spread (Exercises)

1. If the mean time to respond to a stimulus is much higher than the median time to respond, what can you say about the shape of the distribution of response times?

Answer:

If the mean is higher, that means it is farther out into the right-hand tail of the distribution. Therefore, we know this distribution is positively skewed.

2. Compare the mean, median, and mode in terms of their sensitivity to extreme scores.
3. Your younger brother comes home one day after taking a science test. He says that some- one at school told him that “60% of the students in the class scored above the median test grade.” What is wrong with this statement? What if he had said “60% of the students scored above the mean?”

Answer:

The median is defined as the value with 50% of scores above it and 50% of scores below it; therefore, 60% of score cannot fall above the median. If 60% of scores fall above the mean, that would indicate that the mean has been pulled down below the value of the median, which means that the distribution is negatively skewed

4. Make up three data sets with 5 numbers each that have:
 - a. the same mean but different standard deviations.
 - b. the same mean but different medians.
 - c. the same median but different means.
5. Compute the population mean and population standard deviation for the following scores (remember to use the Sum of Squares table): 5, 7, 8, 3, 4, 4, 2, 7, 1, 6

Answer:

$$\mu = 4.80, \sigma^2 = 2.36$$

6. For the following problem, use the following scores: 5, 8, 8, 8, 7, 8, 9, 12, 8, 9, 8, 10, 7, 9, 7, 6, 9, 10, 11, 8
 - a. Create a histogram of these data. What is the shape of this histogram?
 - b. How do you think the three measures of central tendency will compare to each other in this dataset?
 - c. Compute the sample mean, the median, and the mode
 - d. Draw and label lines on your histogram for each of the above values. Do your results match your predictions?
7. Compute the range, sample variance, and sample standard deviation for the following scores: 25, 36, 41, 28, 29, 32, 39, 37, 34, 34, 37, 35, 30, 36, 31, 31

Answer:

$$\text{range} = 16, s^2 = 18.40, s = 4.29$$

8. Using the same values from problem 7, calculate the range, sample variance, and sample standard deviation, but this time include 65 in the list of values. How did each of the three values change?
9. Two normal distributions have exactly the same mean, but one has a standard deviation of 20 and the other has a standard deviation of 10. How would the shapes of the two distributions compare?

Answer:

If both distributions are normal, then they are both symmetrical, and having the same mean causes them to overlap with one another. The distribution with the standard deviation of 10 will be narrower than the other distribution

10. Compute the sample mean and sample standard deviation for the following scores: -8, -4, -7, -6, -8, -5, -7, -9, -2, 0

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