

In this section we will be doing some “number crunching” with data sets to help us to get “a feel” for the center of the data. What do we mean by the CENTER of the data? It is the value where the numbers tend to converge around. It is a single value that describes the data set. We will investigate 4 main types of Measures of Central Tendency:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### MEAN

The *arithmetic mean* of the numbers  $x_1, x_2, x_3, \dots, x_n$  is denoted \_\_\_\_\_ and is calculated:

(This is commonly referred to as “the average”)

Find the mean for the following set of data: 9, 12, 22, 6, 5, 15, 12, 25

We can think of the mean as the *balance point* of our data as they are placed on a line plot. (See page 795). The total distances of each data value from the mean on one side is equal to the total distances from the mean of each data value on the other side.

Suppose a company employs 20 people. The president of the company earns \$200,000, the VP earns \$75,000, and the 18 employees each earn \$10,000. What is the mean? Is this the best number to represent the “average” salary of the company?

## MEAN OF A FREQUENCY TABLE

Temperature x	Frequency f	
52	4	
53	6	
54	3	
55	2	
56	10	
57	5	
<b>Total</b>	<b>30</b>	

The mean of a frequency table is calculated by the formula:

Find the mean of the frequency table. Round to 2 decimal places.

### You try:

Find the mean of the following frequency table. A paramedic service kept track of the number of calls per day that it received over a two-week period. Find the mean number of daily calls over this period.

Number of Calls x	Frequency f	
4	1	
5	4	
6	1	
7	2	
8	3	
9	2	
10	1	
<b>Total:</b>		

## MEDIAN

The value exactly in the \_\_\_\_\_ of the data when the data is arranged from least to greatest. In other words, half of the data will be less than the median and half will be greater. (Note: If there is an even number of data values, then the median is the average of the middle 2 data values.)

## MODE

The data value that appears \_\_\_\_\_, if there is one. Be aware that data sets can have more than one mode or none at all. *Two is the maximum number of modes allowed by definition in this text.*

Find the median and mode of the following data set:      16, 11, 14, 10, 12

Find the median and mode of the following data set:      2, 5, 8, 4, 11, 8

Find the median and mode of the following data set:      60, 70, 95, 100, 60, 95

Temperature x	Frequency f
52	4
53	6
54	3
55	2
56	10
57	5
<b>Total</b>	<b>30</b>

Find the median and the mode of the frequency table.

**OBSERVATIONS:** Which measures of central tendency were affected by extreme values?  
Which were **always** members of the original set of data?  
Which were **sometimes/sometimes not**?

### FIVE-NUMBER SUMMARY

The five-number summary helps to determine the “position” of data items in a data set. The five numbers are:

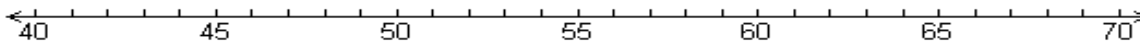
- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_

After calculating each of the above numbers, we can use them in a graph called a **box-and-whisker plot**.

Given the following data set:

42, 43, 46, 51, 51, 51, 52, 54, 55, 55, 56, 56, 60, 61, 61, 64, 69

- a. Find the median -  $Q_2$ . \_\_\_\_\_
- b. What is the lower half?
- c. What is the upper half?
- d. Find  $Q_1$ . \_\_\_\_\_
- e. Find  $Q_3$ . \_\_\_\_\_
- f. List the five-number summary. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
- g. Construct a Box-and-Whisker Plot.



## EXAMPLES:

Suppose you own a hat shop and decide to order hats in only *one* size for the coming season. To decide which size to order, you look at last year's sales figures, which are itemized according to size. Should you find the mean, median or mode for the data? Why?

Faith has an average of 76% of her 3 chemistry tests. What grade would she have to make on the 4<sup>th</sup> test to have an average of 80% and receive a B in the class?

Gina had an 84 and an 86 on her first 2 tests. She thought she did well enough on the final exam to keep her B average. But when she got her grade, she received a D. She checked with her instructor and learned that he had made a mistake by transposing the digits when he recorded her final exam grade. If her *incorrect* average (mean) for the class was 69, what was her correct final exam score? What is her *correct* average?

Construct a box-and-whisker plot for the below data:

20    25    40    50    50    60    70    75    80    80    90    100    100

List the five-number summary.    \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

