

Section 13.2

HW 1-9 odd, 19-27 all, 47, 51

Oct 1-8:45 AM

Measures of Center

- The **mean** is the sum of values, divided by the total number of values.

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{1}{n} \sum_{i=1}^n x_i$$

- The **mode** of a data set is the value that occurs most often.

* A data set can have *two modes*.

* When there are three or more, it becomes a less useful measure of central tendency. In that case, we say there is *no mode*.

Oct 1-8:45 AM

Measures of Center

The **median** is the midpoint of an ordered data set.

It is a value that divides the set into two parts:

* 50% below the median and 50% above the median.

- To find the median of a group of data:
 - * Sort the data from least to greatest
 - * If the number of items is **odd**, the median is the middle item.
 - * If the number of items is **even**, the median is the mean of the two middle numbers.

Oct 1-8:45 AM

Find the median exam score in the following list.

Is there a mode? **no.**

28 (fictional) Exam Scores

3|2
4|
5|5
6|012448
7|35569899
8|0623459
9|02358

$$M = 78.5$$

$$2129 \div 28$$

The sum of the scores is 2129, so the mean is about 76.0
What if the student who scored 32% decided to drop the class.

What is the new mean?

What is the new median?

$$\frac{2129 - 32}{27} = 77.7$$

$$M = 79$$

Oct 1-9:18 AM

The data represents the number of days off per year for a sample of individuals from selected countries.

20, 26, 40, 36, 24, 42, 35, 24, 30, 18, 12, 36, 26, 28, 24, 25, 27, 32, 16

- Find the mode. **24**
- Find the mean if

$$\sum_{i=1}^{19} x_i = 521$$

27.4

- Find the median (here's the sorted list)

12, 16, 18, 20, 24, 24, 24, 25, 26, **26**, 27, 28, 30, 32, 35, 36, 36, 40, 42

* If 12 is in the 1st position and 42 is in the 19th position, in what position is the *median* of the preceding data set? **10th**

* In what position is the median of a data set with 123 items? **62nd**
...with 124 items? **62 → 63**
...with n items? **$\frac{n+1}{2}$**

Oct 1-8:45 AM

The data represents the annual chocolate sales (in billions of dollars) for a sample of eight countries in the world.

\$2.0, 4.9, 6.5, 2.1, 5.1, 3.2, 5.7, **6.6**

- a) Find the mean and the median.

2.0, 2.1, 3.2, 4.9, 5.1, 5.7, 6.5, 6.6

mean = 4.5 M = 5

- b) The annual sale for the **United States** was incorrectly typed \$6.6 billion. The actual annual sale for the U.S. was **16.6 billion**.

Describe how this would affect the calculation of the mean and median.

$\bar{x} = 5.8$

Oct 1-8:45 AM

Extreme Values

Def'n: A **resistant statistic** is not affected by extreme values.

The mean **(is)** / **(is not)** a resistant statistic.

The median **(is)** / **(is not)** a resistant statistic.

Oct 1-8:45 AM

Mean, Median, and Mode

Pulse Rates:

5|4

5|789

6|023344

6|55567789

7|00124

7|58

n = 25

$$\bar{x} = \frac{1646}{25} = 65.84$$

$$M = 65$$

$$\text{mode} = 65$$

Incomes:

5|56666688899999

6|011112334

6|556666789

7|01223

7|

8|0022

n = 41

Key

5|1

means

\$51,000

$$\begin{cases} M = 63 \rightarrow \text{prefer} \\ \bar{x} = 64.39 \\ \text{mode} = 56, 59 \end{cases}$$

Which measure of center is "best" for each data set?

Oct 1-8:45 AM

What-If

- Find a data set of 8 elements that has a mean of 7.

2 3 5 7 7 9 11 12
 1 2 3 4 10 11 12 13
 7 7 7 7 7 7 7 7
~~5~~ ~~5~~ ~~6~~ ~~6~~ ~~7~~ ~~7~~ ~~10~~ ~~10~~
 3 3 3 6 6 14 14

- What if the median of this data set was 6?
- What if the mode of this data set was 3?

Oct 1-8:45 AM

A **weighted average** is one in which different data in the data set are given different "weights".

In general, the weighted mean of n numbers, $x_1, x_2, x_3, \dots, x_n$ that are weighted by the respective factors $f_1, f_2, f_3, \dots, f_n$ is given by

$$\bar{w} = \frac{\sum_{i=1}^n x_i \cdot f_i}{\sum_{i=1}^n f_i}$$

Oct 1-8:57 AM

The U.S. National Center for Health Statistics compiles data on the length of stay by patients in short-term hospitals and publishes its findings in Vital and Health Statistics. A random sample of 21 patients yielded the following data on length of stays, in days. Find the average length of stay.

# Days (x)	Frequency	$x \cdot f$
1	3	3
2	4	8
3	6	18
4	3	12
5	2	10
6	2	12
9	1	9

$$\frac{72}{21} = 3.4$$

21

72 days

Oct 1-9:00 AM

Reflect:

1. Why is the median considered a *resistant* statistic, but not the mean?
2. Why does the formula for weighted average make sense?

13.2 HW 1-9 odd, 19-27 all, 47, 51

Oct 1-9:35 AM