

# Statistics – Measures of Central Tendency

- measures of central tendency → represents the center or middle of a set of data

- mean – the sum of numerical observations divided by the number of observations
  - a common notation for mean is  $\bar{x}$  (often called “ $x$  bar”)
  - it can also be written in this form  $\frac{x_1 + x_2 + x_3 + \dots + x_n}{n} = \frac{1}{n} \sum_{i=1}^n x_i$
- median – after arranging the numbers from least → greatest, it represents the middle #
  - if there are an odd number of numbers then truly take the middle number
  - if there are an even number of numbers then take the average of two middle numbers
- mode – represents the number that occurs the most often
  - if no number occurs more often than any other, then the data is amodal
  - if there are two numbers that occur that same number of times, then the data is bimodal

**Examples:** Find the measures of central tendency for each the data sets below.

- 1.) A sweepstakes offers a first prize of \$10,000, two second prizes of \$100, and one hundred third prizes of \$10.  $\frac{10(100) + 2(100) + 10000}{103}$

a.) Which measure of central tendency BEST represents the available prizes?

mode (= \$10) b/c represents most prizes that participants can get

mean = 109  
median = 10  
mode = 10

b.) Which measure of central tendency would the organizers of the sweepstakes be most likely to use in their advertising?

mean ( $\approx$  \$109) b/c it will make people think they'd have a better chance of winning more money!

- 2.) Below are Mr. Dent's Algebra 2 class test scores.

72	70	71	76	90	68	81	86	34	94
71	84	89	67	19	85	75	66	80	94

a.) List the test scores from least to greatest:

19, 34, 66, 67, 68, 70, 71, 72, 75, 76, 77 (middle), 80, 81, 84, 85, 86, 89, 90, 94, 94 (most often)

b.) What are the measures of central tendency of the scores?

mean = 73.9      median = 76.5      mode = 94  
(76 + 77) ÷ 2

c.) Mr. Dent's students asked how they did on the test. Which measure of central tendency would best answer the students' question?

the mean since it truly represents the avg of the entire class.  
if the students scored above the mean, it could represent how they did compared to other students.



3.) Use the stem-leaf plot below: ① Put in LI ② Stat Calc ③ 1-var stats

Stem	Leaf
4	4 5 6 7 7
5	3 5 6 7 8 9
6	7 7 8 9 9 9

a.) What is the mean? 57.4

b.) What is the median? 57

c.) What is the mode? 69

d.) Is having the data set up like this helpful? Explain.

Yes, already in order from least to greatest, can tell the mode easily.

4.) The table lists the areas of some large shopping malls in the United States.

Mall	Gross Leasable Area (ft <sup>2</sup> )
1 Del Amo Fashion Center, Torrance, CA	3,000,000
2 South Coast Plaza/Crystal Court, Costa Mesa, CA	2,918,236
3 Mall of America, Bloomington, MN	2,472,500
4 Lakewood Center Mall, Lakewood, CA	2,390,000
5 Roosevelt Field Mall, Garden City, NY	2,300,000
6 Gurnee Mills, Gurnee, IL	2,200,000
7 The Galleria, Houston, TX	2,100,000
8 Randall Park Mall, North Randall, OH	2,097,416
9 Oakbrook Shopping Center, Oak Brook, IL	2,006,688
10 Sawgrass Mills, Sunrise, FL	2,000,000
10 The Woodlands Mall, The Woodlands, TX	2,000,000
10 Woodfield, Schaumburg, IL	2,000,000

a.) Find the measures of central tendency:

$$\text{mean} = \frac{2,290,403.3}{(27484840 \div 12)}$$

$$\text{median} = \frac{2,150,000}{(2,000,000 + 2,100,000) \div 2}$$

$$\text{mode} = 2,000,000$$

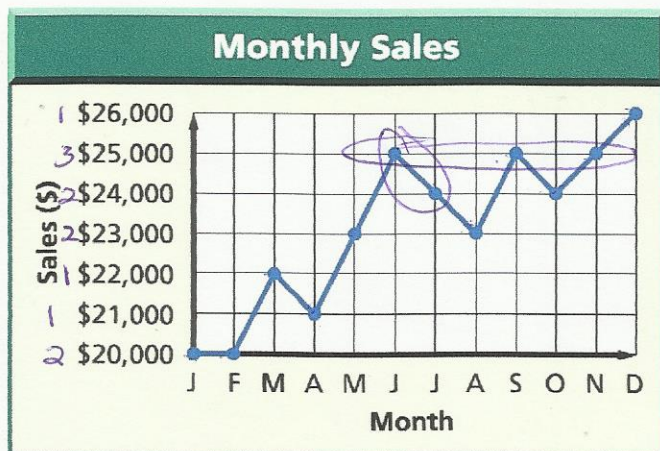
b.) You are a realtor who is trying to lease mall space in different areas of the country to a large retailer. Which measure would you talk about if the customer felt that the malls were too large for his store?

mode b/c its numbers is the lowest out of the 3.

c.) Which measure would you talk about if the customer had a large inventory?

mean b/c its number is the highest out of the 3.

5.) A graph of monthly sales is given below:



a.) Find the measures of central tendency:

$$\text{mean} = 23,200 \quad (23.2)$$

$$\text{median} = 24,500 \quad (24.5)$$

$$\text{mode} = 25,000$$

b.) What types of situations could this graph be used for?

① selling company to show company is gaining money

② employees sales → deserve raise?