Chapter _____: ____

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12.6 Statistical Measures

Measures of Variation or Dispersion
Used to measure how spread out or scattered a set of data is. **Variance** and **standard deviation** are measures of variation that indicate how much the data differ from the mean.

To find the **variance** of a set of data, follow these steps.

Step 1: _____ **Step 4:** _____

Step 2: _____ **Step 5:** _____

Step 3: _____

***** The **standard deviation** is the square root of the variance.

Example 1: Variance & Standard Deviation

a) The table at the right shows the lengths in thousands of miles of some of the longest rivers in the world. Find the standard deviation for these data.

River	Length (thousands of miles)
Nile	4.16
Amazon	4.08
Missouri	2.35
Rio Grande	1.90
Danube	1.78

b) A teacher has the following test scores: 100, 4, 76, 85, and 92. Find the standard deviation for these data.

Example 2: Variance & Standard Deviation with Stem-and-Leaf Plots
In a stem-and-leaf plot, data is organized in two columns. The greatest place value of the data is used for the stems. The next greatest place value forms the leaves. Stem-and-leaf plots are useful for organizing long lists of numbers.

a) Write the list of numbers that represent the data in the following stem-and-leaf plots.

(1)

Stem	Leaf
1	1 8
2	5 6 9
3	1 3 5 5 7 8 9 9 9
4	0 0

$3|1 = 3.1$

(2)

Stem	Leaf
1	8 1
2	5 6 9
3	9 1 9 8 7 9 5 3 5
4	0 0

b) Find the standard deviation for the data in Example 2, 1a.

12.6/12.7 Statistical Measures & The Normal Distribution

Measures of Central Tendency

Used to represent the center or middle of the data. The most commonly used measures ot central tendency are the mean, median, and mode. When deciding the measure of central tendency to use to represent a set of data, look closely at the data itself

Use	When...

Example 1: Choose a Measure of Central Tendency

a) The table at the right shows the populations of the six New England capitals. Which would be the most appropriate measure of central tendency to represent the data. Explain why and find that value.

City	Population (rounded to the nearest 1000)
Augusta, ME	19,000
Boston, MA	589,000
Concord, NH	37,000
Hartford, CT	122,000
Montpelier, VT	8,000
Providence, RI	174,000

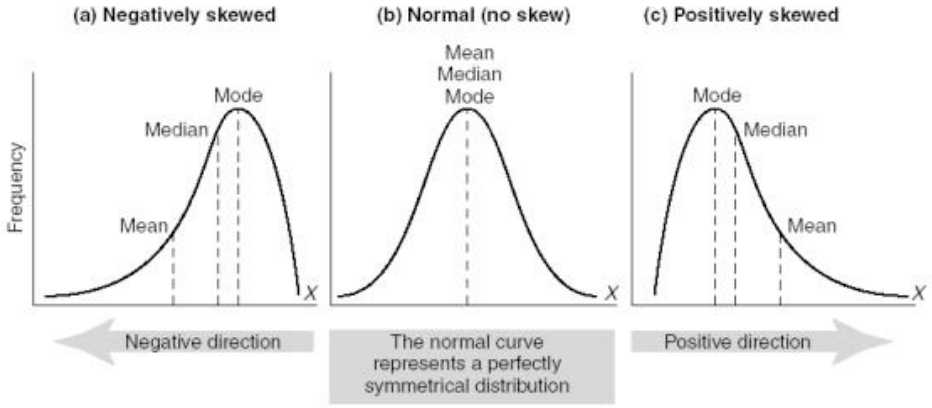
Source: www.factfinder.census.gov

b) A salesperson had sales of $11,000, $15,000, $11,000, $16,000, $12,000, and $12,000 in the last six months. Which measure of central tendency would he be likely to use to represent these data when he talks with his supervisor? Explain why and find the value.

12.6/12.7 Statistical Measures & The Normal Distribution

Normal & Skewed Distributions

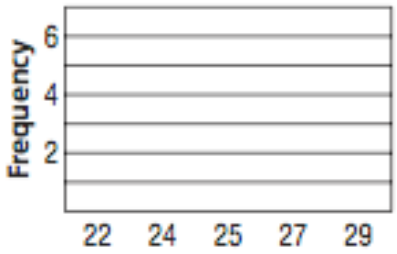
Continuous probability distributions are represented by curves. The types of continuous distributions are:



Example 2: Classify a Data Distribution

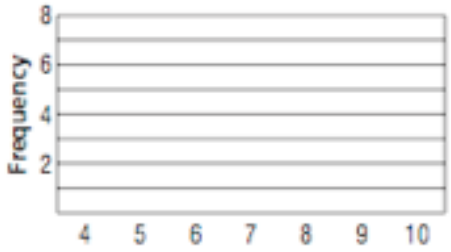
Determine whether the data in each table appear to be *positively skewed*, *negatively skewed*, or *normally distributed*. Make a histogram of the data.

a) {27, 24, 29, 25, 27, 22, 24, 25, 29, 24, 25, 22, 27, 24, 22, 25, 24, 22}



b)

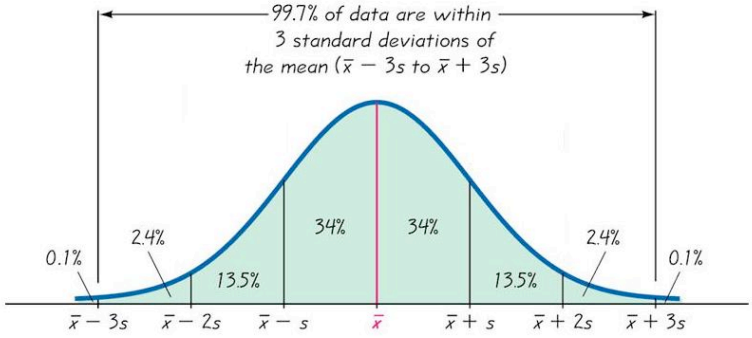
Shoe Size	4	5	6	7	8	9	10
No. of Students	1	2	4	8	5	1	2



12.7 The Normal Distribution

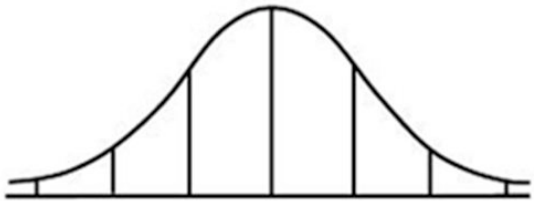
Use Normal Distributions
Standardized test scores, the lengths of newborn babies, the useful life and size of manufactured items, and production levels can all be represented by normal distributions. Normal distributions have the following properties:

- **the graph is maximized at the mean**
- **mean, median, and mode are about equal**



Examples: Normal Distributions

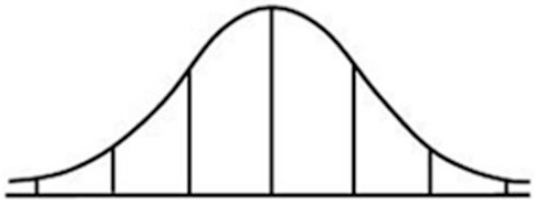
a) The number of eggs laid per year by a particular breed of chicken is normally distributed with a mean of 225 and a standard deviation of 10 eggs.



(1) About what percent of the chickens will lay between 215 and 235 eggs per year?

(2) In a flock of 400 chickens, about how many would you expect to lay more than 245 eggs per year?

b) The diameter of bolts produced by a manufacturing plant is normally distributed with a mean of 18mm and a standard deviation of 0.2mm.



(1) What percent of bolts coming off of the assembly line have a diameter greater than 18.4mm?

(2) What percent have a diameter between 17.8 and 18.2mm?