

Section 2.1

**Stem-and-Leaf Displays** The following graph gives the percentages of each state's total number of college or university student loans that are in default for the 50 states and the District of Columbia.

Stem-and-leaf of Percent N = 51 Leaf Unit = 1.0

```

      1  0  3
      3  0  55
     11  0  66666777
     23  0  888888999999
    (11) 1  00000011111
     17  1  2222233
     10  1  444555
      4  1  667
      1  1
      1  2  0
```

1. The above graph is a Stem and Leaf Display.
2. Alaska is the state with the highest percentage of student loans in default. What is that default rate?
3. Wyoming is the state with the lowest percentage of student loans in default. What is that default rate?
4. What percent of states (and DC) have at least 10% of their student loans in default?

**Example: We will organize the following data into a stem and leaf display.**

Are cigarettes bad for people? Cigarette smoking involves tar, carbon monoxide and nicotine. Nicotine can cause addiction. The following data provides the nicotine level per cigarette (in mg) of a random sample of brands of cigarettes. Construct a Stem-and-Leaf Display with five leaves per stem.

0.1, 0.4, 0.4, 0.5, 0.6, 0.6, 0.6, 0.7, 0.7, 0.7, 0.8, 0.8, 0.9, 0.9, 0.9, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.0, 1.1, 1.2,  
2.0

1. Identify the variable.
2. The brand of cigarettes called Now cigarettes has the lowest amount of nicotine per cigarette. According to the graph above, what is the nicotine level for each Now cigarette?
3. The brand of cigarettes called Bull Durham cigarettes has the highest amount of nicotine per cigarette. According to the graph above, what is the nicotine level for each Bull Durham cigarette?
4. What percent of cigarette brands have less than 1.0 mg of nicotine per cigarette?

### **Your turn!**

Get into groups of 2 to 4 students.

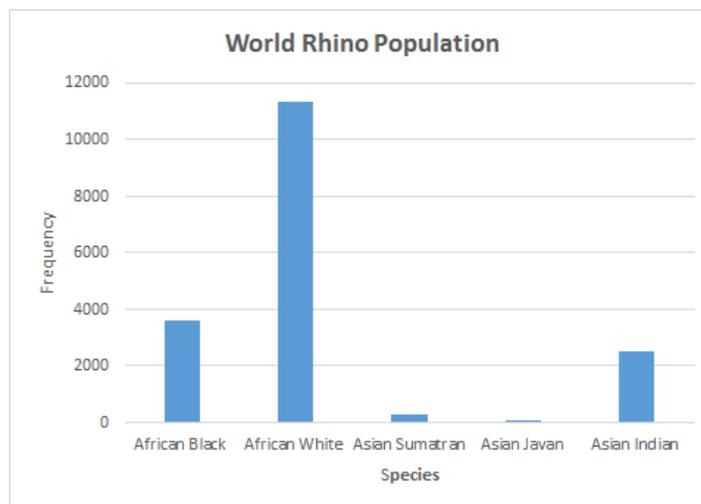
Your assignment is to arrange the following data into two different displays. The first is a histogram with four classes and a stem and leaf display where you have *two rows per stem*. Turn in one paper per group with everyone's names on it:

5, 6, 10, 26, 14, 28, 23, 15, 21, 28, 24, 27, 9, 16, 16, 19, 0, 4, 3, 12, 17, 21, 25, 10, 11,  
20, 29, 12, 15, 16, 6, 5, 3, 8, 7, 4, 18, 19, 12, 15, 14, 4, 10, 12, 16, 17, 7, 16, 12, 20, 4, 4, 8, 8

### Example

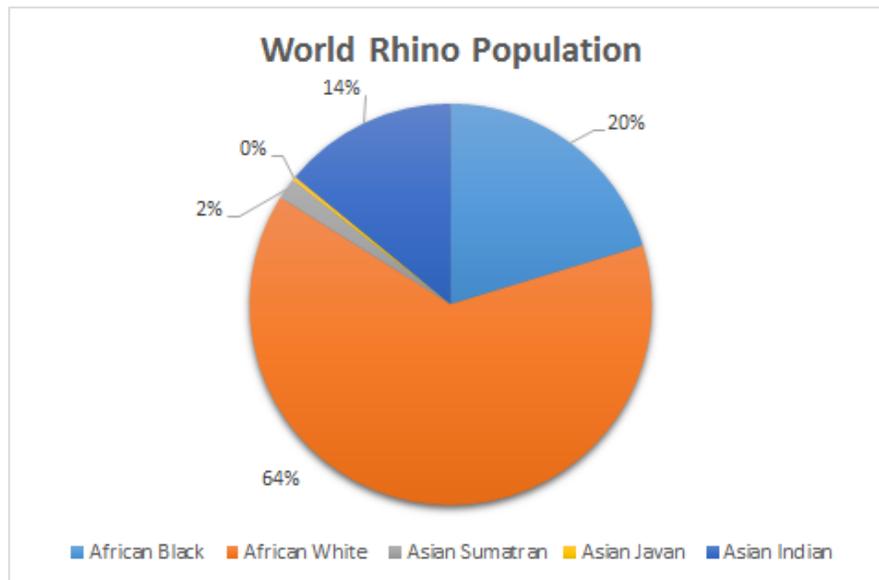
The International Rhino Federation estimates that there are 17800 rhinoceroses living in the wild in Africa and Asia. A Breakdown of the number of rhinos of each species is reported in the accompanying table:

| Rhino Species  | Population Estimate |
|----------------|---------------------|
| African Black  | 3610                |
| African White  | 11330               |
| Asian Sumatran | 300                 |
| Asian Javan    | 60                  |
| Asian Indian   | 2500                |



1. What type of graph is displayed above?
2. Is this a Pareto chart? If not, how would the above graph need to be changed in order to make it a Pareto chart?
3. What percentage of rhinos are Asian?

**Example**



1. What type of graph is displayed above?

2. Is it true that a majority of rhinos are African White? Explain.

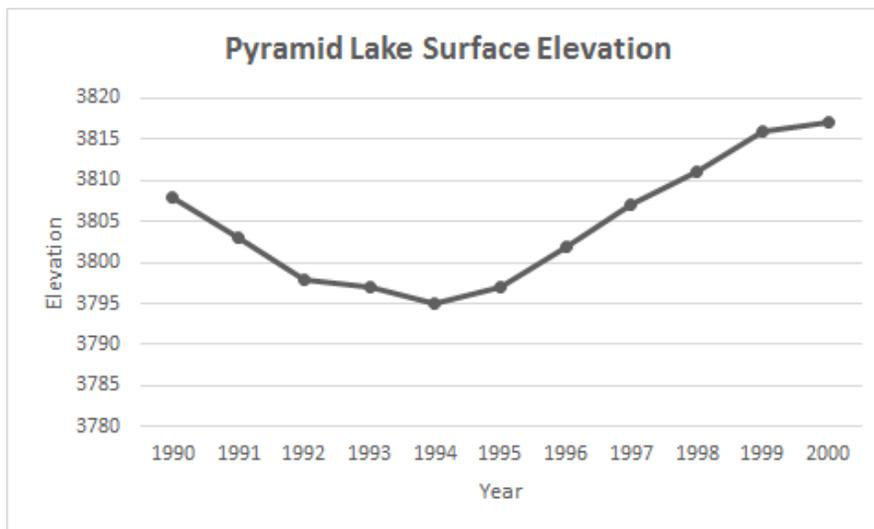
3. What percentage of rhinos are Asian?

### Section 2.2

#### Example

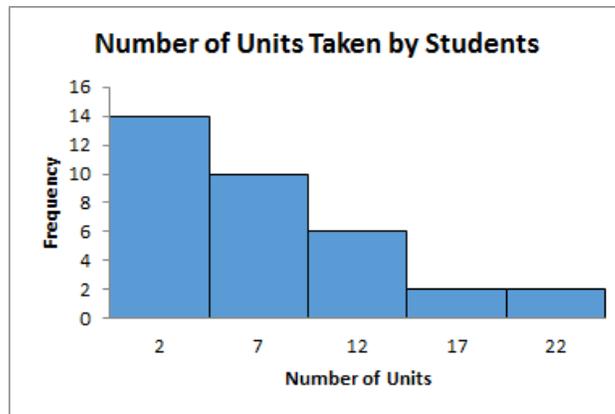
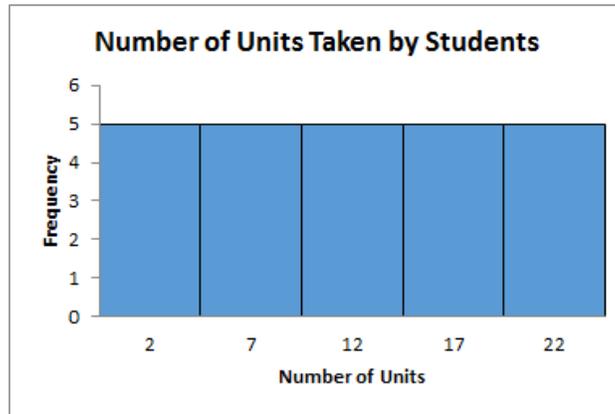
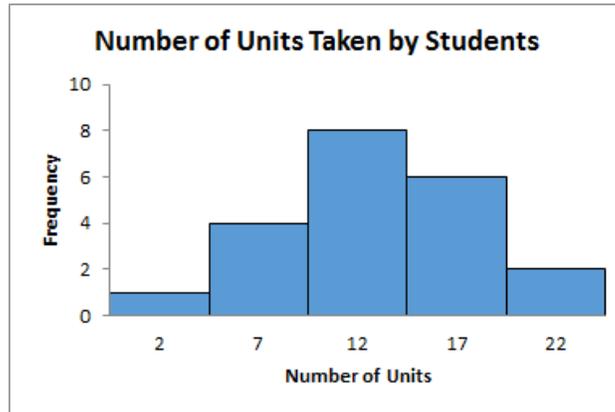
Pyramid Lake, Nevada, is described as the pride of the Paiute Indian Nation. It is a beautiful desert lake famous for very large trout. The elevation of the lake surface (feet above sea level) varies according to the annual flow of the Truckee River from Lake Tahoe. The U.S. geological Survey provided the following data:

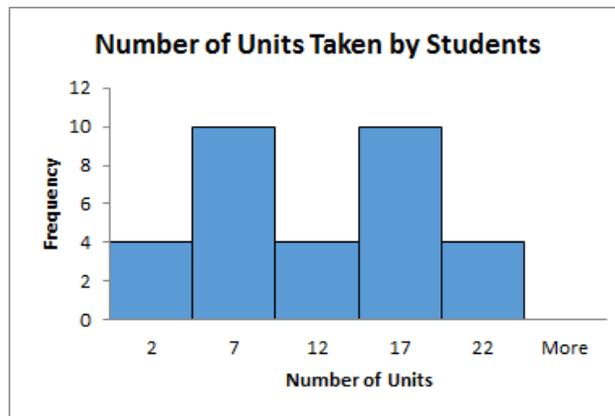
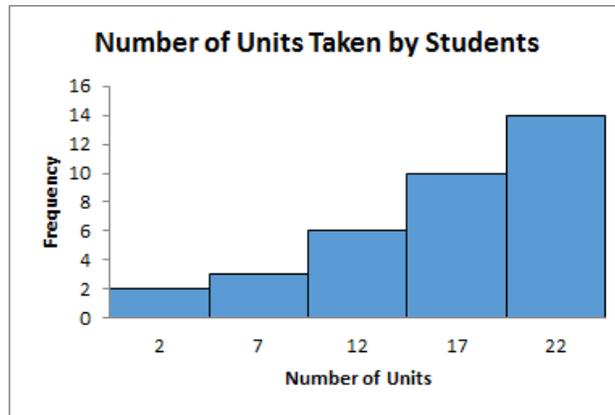
| Yr. | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----|------|------|------|------|------|------|------|------|------|------|------|
| El. | 3808 | 3803 | 3798 | 3797 | 3795 | 3797 | 3802 | 3807 | 3811 | 3816 | 3817 |

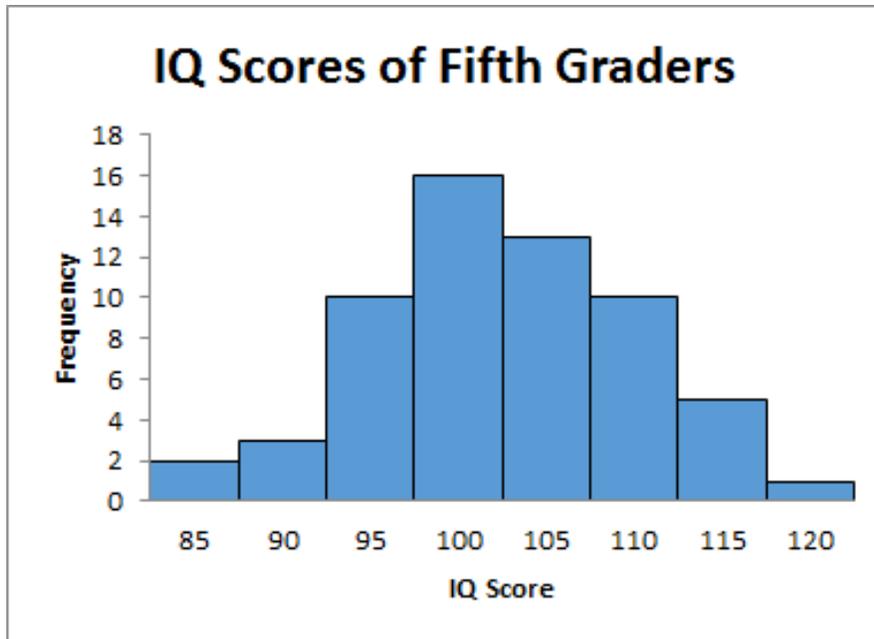


1. What type of graph is displayed above?
2. In the first part of the 1990's, is the lake surface elevation increasing or decreasing?
3. In the second part of the 1990's, is the lake surface elevation increasing or decreasing?

**Basic Graph Shapes:** Identify the following Histogram Graph shapes:







1. Describe the shape of the graph.
2. What percent of students have an IQ score of at least 108?
3. What is the IQ score such that 10% of the IQ scores are this value or bigger?

4.

| Lower CL | Upper CL | Lower CB | Upper CB | Frequency | Relative Frequency |
|----------|----------|----------|----------|-----------|--------------------|
|          |          |          |          |           |                    |

**Example:**

For the following data, fill out the table and graph the histogram and Ogive with five classes.

24, 25, 25, 27, 27, 29, 30, 35, 35, 35, 36, 38, 38, 39, 39, 40, 40, 40, 45, 45, 45, 45, 47, 52, 52, 52, 58, 59,  
59, 61, 61, 67, 68, 68, 68

| Lower CL | Upper CL | Lower CB | Upper CB | Freq. | Rel. Freq. | Cumul. Freq. | Midp. |
|----------|----------|----------|----------|-------|------------|--------------|-------|
|          |          |          |          |       |            |              |       |

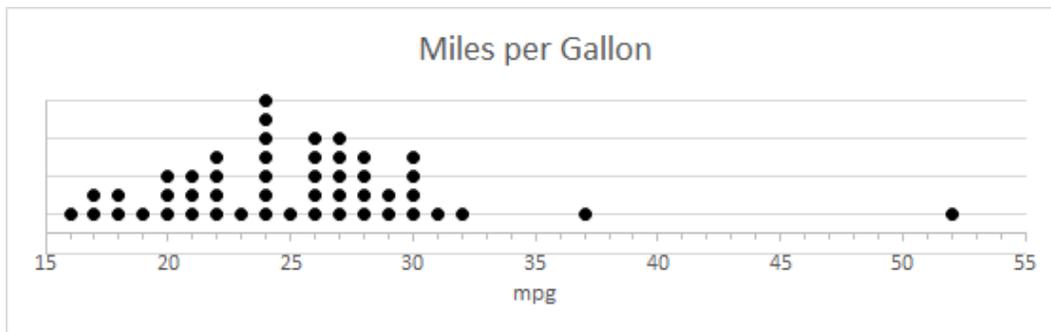
**Example:** Create a histogram for the following data, use five classes:

24, 25, 25, 27, 27, 29, 30, | 35, 35, 35, 36, 38, 38, 39, 39, 40, 40, 40, | 45, 45, 45, 45, 47, | 52, 52, 52, 58, 59,  
59, | 61, 61, 67, 68, 68, 68

**Example:**

The following data represent highway fuel consumption in miles per gallon (mpg) for a random sample of 50 models of cars. Each dot represents one car. Use the graph below to answer the questions.

1. The following is called a Dot Plot
2. Does this data set appear to have any outliers? Explain.
3. What percent of the cars have a fuel consumption of at least 30 mpg?





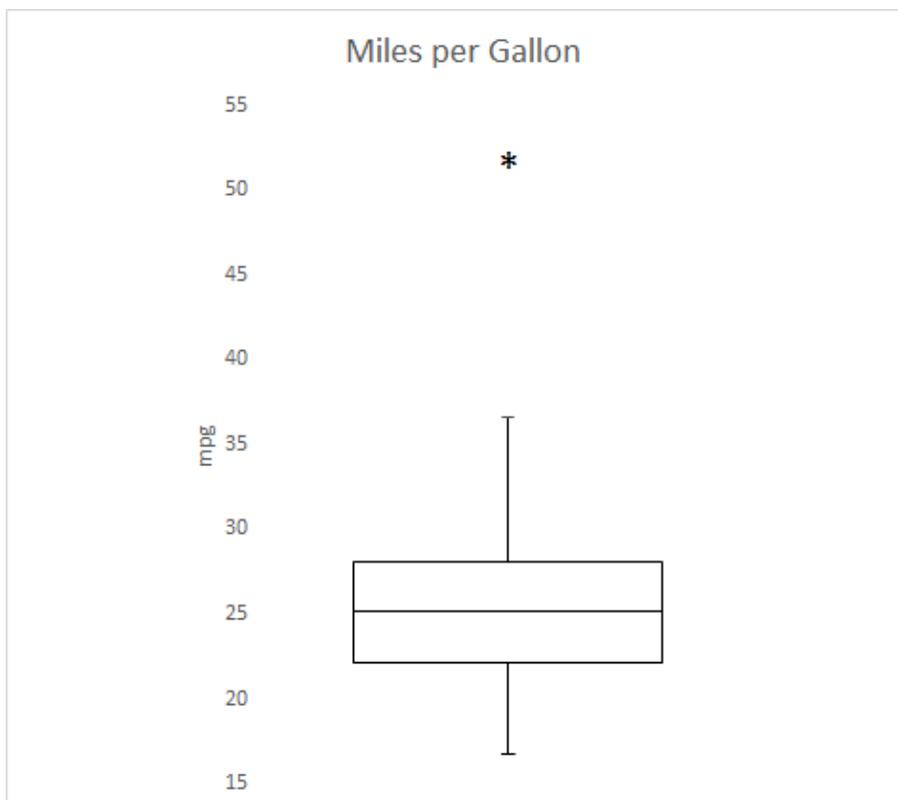
### Section 2.4

**Example** Consider the following random sample of test scores (in percentages) from a biology final exam.

95, 65, 70, 75, 74, 86, 82, 95, 45, 80, 72, 70, 78, 72, 80

1. Find the five-number summary for this data set.
2. Make a box-and-whisker plot.

### Example



1. Locate the values of the five-number summary on the graph below.
2. Describe the shape of the distribution.
3. Does this data set contain any outliers? Explain.



### Section 2.5

#### **Example:**

Under the STAT menu, select Edit

Enter the following data set into your calculator list 1:

|   |   |   |   |    |   |   |   |   |   |    |   |
|---|---|---|---|----|---|---|---|---|---|----|---|
| 3 | 5 | 6 | 9 | 2  | 5 | 6 | 4 | 7 | 2 | 12 | 7 |
| 5 | 6 | 7 | 3 | 8  | 9 | 2 | 5 | 4 | 7 | 5  | 6 |
| 6 | 7 | 3 | 6 | 10 | 3 | 1 | 7 | 3 | 6 | 3  | 8 |
| 7 | 7 | 3 | 5 | 1  | 7 | 4 | 9 | 3 | 8 | 3  | 9 |

We will use our calculators to find the mean.

#### **Example:**

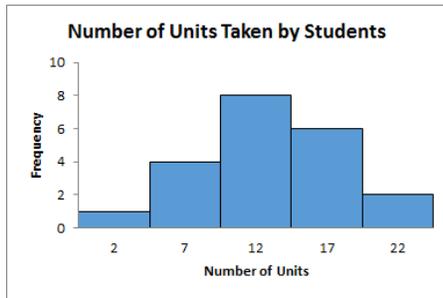
How expensive is Maui? The Maui News gave the following costs in dollars per day for a random sample of condos on Maui.

89, 50, 68, 60, 375, 55, 500, 71, 40, 65, 50, 50

- Compute the mean.
- Compute the median.
- Compute the mode.
- If you were a travel agent and a client asked you about the typical daily cost of a condo rental in Maui, what value would you give?

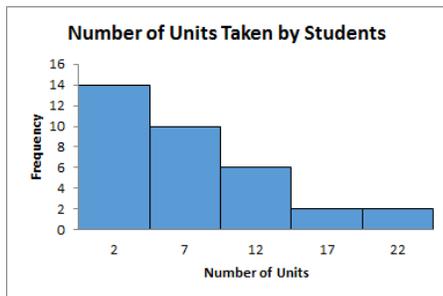
Section 2.6

**Example:** Recall this mound-shaped histogram:



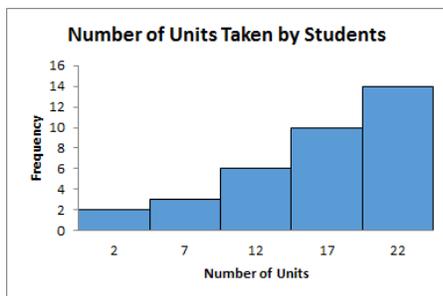
Where is the Mean, Median, and Mode located?

**Example:** Recall this skewed right histogram:



Where is the Mean, Median, and Mode located?

**Example:** Recall this skewed left histogram:



Where is the Mean, Median, and Mode located?

### Section 2.7

**Example:** Suppose that we have two data sets, call them data set A and data set B:

A: 10 20 30 40 50 60 70  
B: 10 35 37 40 43 45 70

1. What is the range of each data set?
  
  
  
  
  
  
  
  
  
  
2. What is the variance of each data set?
  
  
  
  
  
  
  
  
  
  
3. What is the standard deviation of each data set?

**Example:** A school system employs teachers at salaries between \$30000 per year and \$60000 per year. The teachers' union and the school board are negotiating the form of next year's increase in the salary schedule.

Suppose that each teacher is given a flat \$1000 raise.

1. Will the mean salary change? If so, will it go up or down? Explain.
  
  
  
  
  
  
  
  
  
  
2. Will the median salary change? If so, will it go up or down? Explain.
  
  
  
  
  
  
  
  
  
  
3. Will the standard deviation of the salaries change? If so, will it go up or down? Explain.

**Example:** A school system employs teachers at salaries between \$30000 per year and \$60000 per year. The teachers' union and the school board are negotiating the form of next year's increase in the salary schedule.

Suppose that the teachers each receive a 5% raise. The amount of the raise will then vary from \$1500 to \$3000, depending on present salary.

1. Will the mean salary change? If so, will it go up or down? Explain.
2. Will the median salary change? If so, will it go up or down? Explain.
3. Will the standard deviation of the salaries change? If so, will it go up or down? Explain.

**Example:** One high school graduating class had an average GPA of 2.9 with a standard deviation of .4. Another high school graduating class had an average GPA of 3.1 with a standard deviation of .5. Two students applied for the same college, with the same GPA of 3.6. Which student did better relatively to their graduating classes?