**Section 2.2 Organizing Quantitative Data: The Popular Displays**

**Objectives**

1. Organize Discrete Data in Tables
2. Construct Histograms of Discrete Data
3. Organize Continuous Data in Tables
4. Construct Histograms of Continuous Data
5. Draw Dot Plots
6. Identify the Shape of a Distribution

***Objective 1: Organize Discrete Data in Tables***

Objective 1, Page 1

1. What do we use to create the classes when the number of distinct data values of a discrete variable is small?

Objective 1, Page 2

**Example 1 *Constructing Frequency and Relative Frequency Distributions from Discrete Data***

The manager of a Wendy’s® fast-food restaurant wants to know the typical number of customers who arrive during the lunch hour. The data represent the number of customers who arrive at Wendy’s for 40 randomly selected 15-minute intervals of time during lunch. Construct a frequency and relative frequency distribution.

**Number of Arrivals at Wendy’s**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 6 | 6 | 4 | 6 | 2 | 6 |
| 5 | 6 | 6 | 11 | 4 | 5 | 7 | 6 |
| 2 | 7 | 1 | 2 | 4 | 8 | 2 | 6 |
| 6 | 5 | 5 | 3 | 7 | 5 | 4 | 6 |
| 2 | 2 | 9 | 7 | 5 | 9 | 8 | 5 |

***Objective 2: Construct Histograms of Discrete Data***

Objective 2, Page 1

1. Explain how a histogram is constructed.

Objective 2, Page 2

**Example 2 *Drawing a Histogram of Discrete Data***

Construct a frequency histogram and a relative frequency histogram using the data in Table 9. Recall that this table summarizes the data for the number of customers who arrive at Wendy's for 40 randomly selected 15-minute intervals of time during lunch.

**Table 9**

| **Number of Customers** | **Frequency** | **Relative Frequency** |
| --- | --- | --- |
| 1 | 1 | 0.25 |
| 2 | 6 | 0.15 |
| 3 | 1 | 0.025 |
| 4 | 4 | 0.1 |
| 5 | 7 | 0.175 |
| 6 | 11 | 0.275 |
| 7 | 5 | 0.125 |
| 8 | 2 | 0.05 |
| 9 | 2 | 0.05 |
| 10 | 0 | 0.0 |
| 11 | 1 | 0.025 |

OBJECTIVE 2, PAGE 2 (CONTINUED)

***Objective 3: Organize Continuous Data in Tables***

Objective 3, Page 1

**Note:** When a data set consists of a large number of different discrete data values or when a data set consists of continuous data, we must create classes by using intervals of numbers.

Define the following terms.

1. Lower class limit
2. Upper class limit
3. Class width
4. When creating classes for a frequency distribution, the classes must not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Objective 3, Page 2

1. What is an open-ended table?

Objective 3, Page 3

**Example 3 *Organizing Continuous Data into a Frequency and Relative Frequency Distribution***

Suppose you are considering investing in a Roth IRA. You collect the data in Table 12, which represent the five-year rate of return (in percent, adjusted for sales charges) for a simple random sample of 40 large-blend mutual funds. Construct a frequency and relative frequency distribution of the data.

**Table 12 Five-Year Rate of Return of Mutual Funds (in percent)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 10.94 | 14.60 | 12.80 | 16.00 | 11.93 | 15.68 | 9.03 | 13.40 |
| 10.53 | 13.98 | 13.86 | 12.36 | 13.54 | 9.94 | 13.94 | 13.63 |
| 14.12 | 14.88 | 14.77 | 13.13 | 8.28 | 19.43 | 12.98 | 13.16 |
| 12.26 | 14.20 | 14.80 | 13.26 | 13.67 | 10.08 | 14.86 | 8.71 |
| 12.17 | 10.26 | 15.22 | 13.26 | 13.55 | 13.90 | 15.64 | 12.80 |

Data from [Morningstar.com](http://morningstar.com/)

***Objective 4: Construct Histograms of Continuous Data***

Objective 4, Page 2

**Example 4 *Drawing a Histogram of Continuous Data***

Construct a frequency and relative frequency histogram of the five-year rate of return data discussed in Example 3.

**Table 12 Five-Year Rate of Return of Mutual Funds (in percent)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 10.94 | 14.60 | 12.80 | 16.00 | 11.93 | 15.68 | 09.03 | 13.40 |
| 10.53 | 13.98 | 13.86 | 12.36 | 13.54 | 09.94 | 13.93 | 13.63 |
| 14.12 | 14.88 | 14.77 | 13.13 | 08.28 | 19.43 | 12.98 | 13.16 |
| 12.26 | 14.20 | 14.80 | 13.26 | 13.67 | 10.08 | 14.86 | 8.71 |
| 12.17 | 10.26 | 15.22 | 13.36 | 13.55 | 13.90 | 15.64 | 12.80 |

Data from [Morningstar.com](http://morningstar.com/)

Objective 4, Page 4

There is no one correct frequency distribution for a particular set of data. However, some frequency distributions better illustrate patterns within the data than others. So constructing frequency distributions is somewhat of an art form. Use the distribution that seems to provide the best overall summary of the data.

Objective 4, Page 5

*Answer the following after using the applet in Activity 1: Choosing Class Width.*

1. What happens to the number of classes as the bin width increases?

Objective 4, Page 7

1. The number of classes in a frequency distribution is typically between what two numbers?
2. Explain how to choose the lower class limit of the first class in a frequency distribution.
3. Once you decide on the number of classes, explain how to determine the class width.

***Objective 5: Draw Dot Plots***

Objective 5, Page 1

1. Explain how to draw a dot plot.

Objective 5, Page 2

**Example 5 *Drawing a Dot Plot***

Draw a dot plot for the data from Table 8.

**Table 8 Number of Arrivals at Wendy’s**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7 | 6 | 6 | 6 | 4 | 6 | 2 | 6 |
| 5 | 6 | 6 | 11 | 4 | 5 | 7 | 6 |
| 2 | 7 | 1 | 2 | 4 | 8 | 2 | 6 |
| 6 | 5 | 5 | 3 | 7 | 5 | 4 | 6 |
| 2 | 2 | 9 | 7 | 5 | 9 | 8 | 5 |

***Objective 6: Identify the Shape of a Distribution***

Objective 6, Page 1

1. Draw an example of a uniform distribution.
2. Draw an example of a bell-shaped distribution.
3. Draw an example of a distribution that is skewed right.

Objective 6, Page 1 (continued)

1. Draw an example of a distribution that is skewed left.

Objective 6, Page 2

**Example 6 *Identifying the Shape of a Distribution***

Figure 10 displays the histogram obtained in Example 4 for the five-year rate of return for large-blended mutual funds. Describe the shape of the distribution.

**Figure 10**

