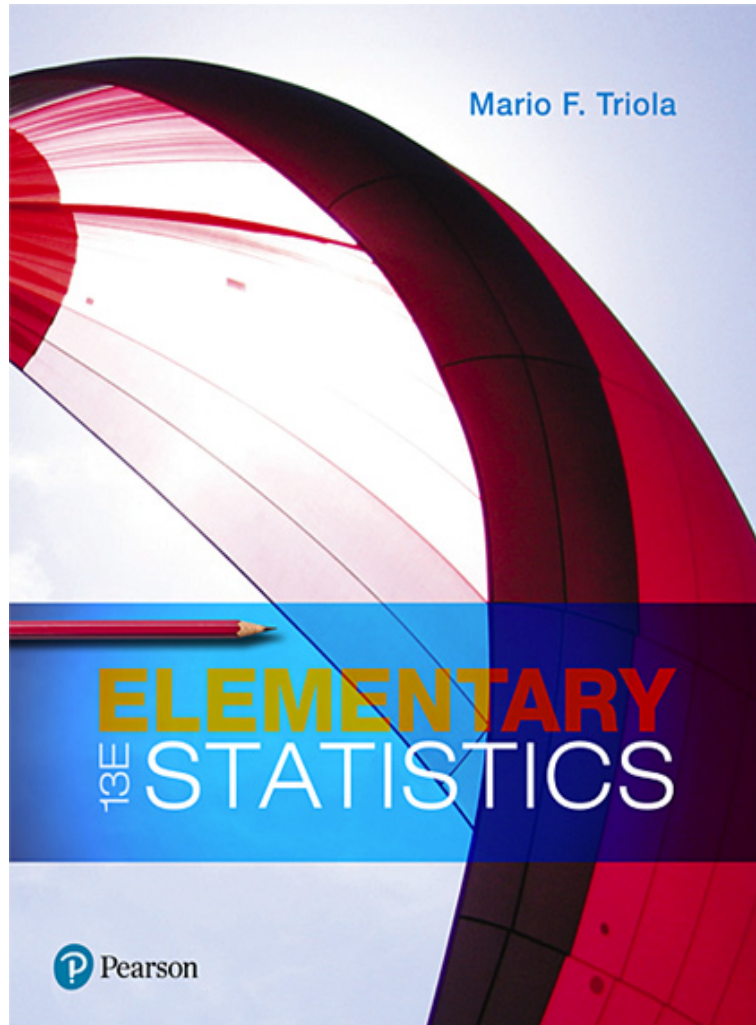


Elementary Statistics

Thirteenth Edition



Chapter 2

Exploring Data with Tables and Graphs

Exploring Data with Tables and Graphs

2-1 Frequency Distributions for Organizing and Summarizing Data

2-2 Histograms

2-3 Graphs that Enlighten and Graphs that Deceive

2-4 Scatterplots, Correlation, and Regression

Key Concept

While a frequency distribution is a useful tool for summarizing data and investigating the distribution of data, an even better tool is a **histogram**, which is a graph that is easier to interpret than a table of numbers.

Histogram

- **Histogram**

- A graph consisting of bars of equal width drawn adjacent to each other (unless there are gaps in the data)

The horizontal scale represents classes of quantitative data values, and the vertical scale represents frequencies. The heights of the bars correspond to frequency values.

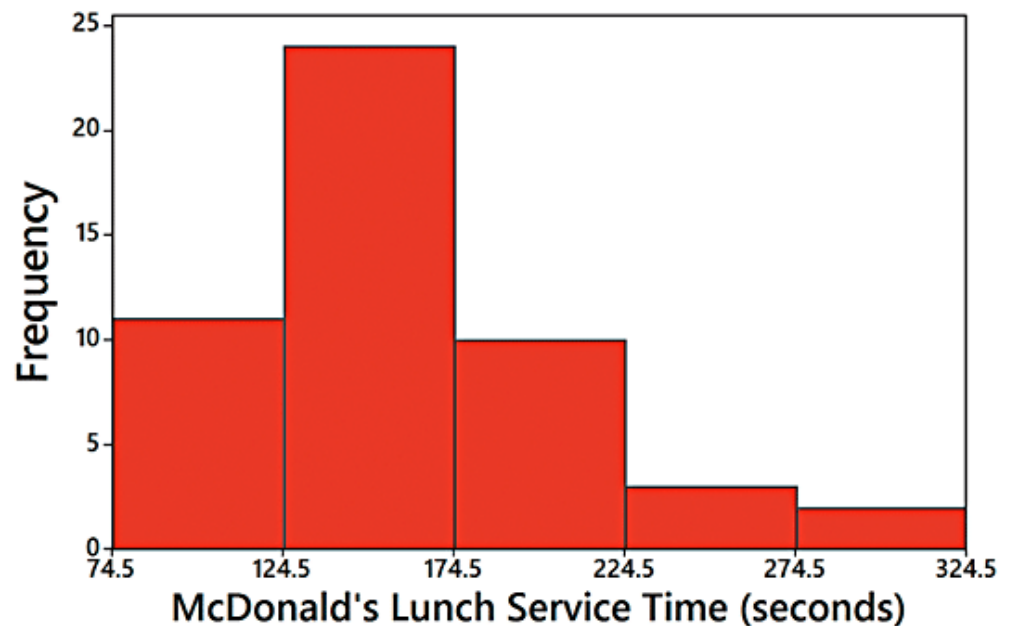
Important Uses of a Histogram

- Visually displays the shape of the **distribution** of the data
- Shows the location of the **center** of the data
- Shows the **spread** of the data
- Identifies **outliers**

Relative Frequency Histogram

- **Relative Frequency Histogram**
 - It has the same shape and horizontal scale as a histogram, but the vertical scale is marked with relative frequencies instead of actual frequencies.

Time (seconds)	Frequency
75-124	11
125-174	24
175-224	10
225-274	3
275-324	2

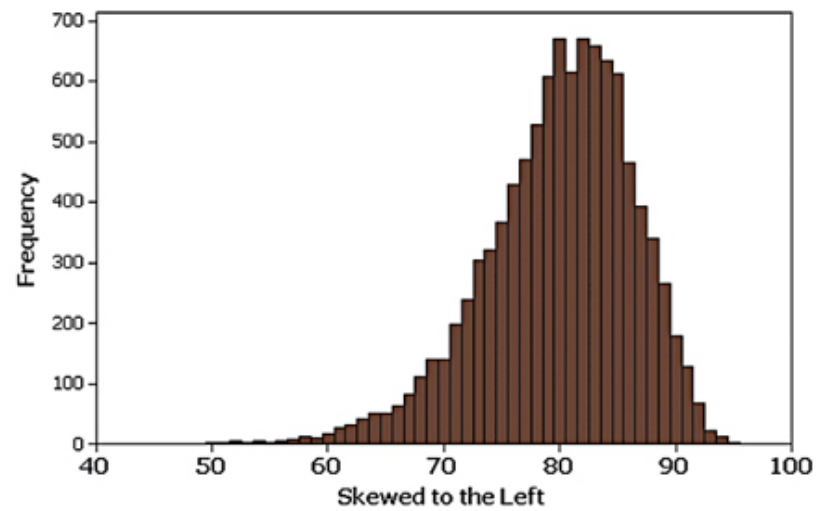
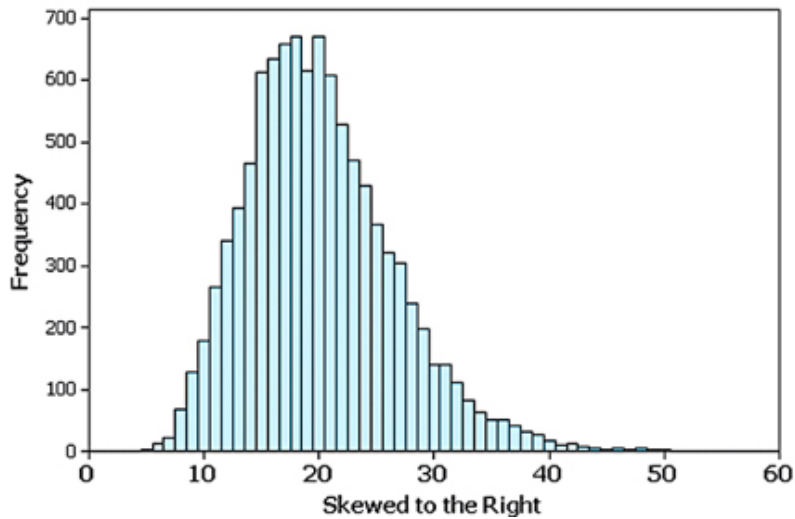
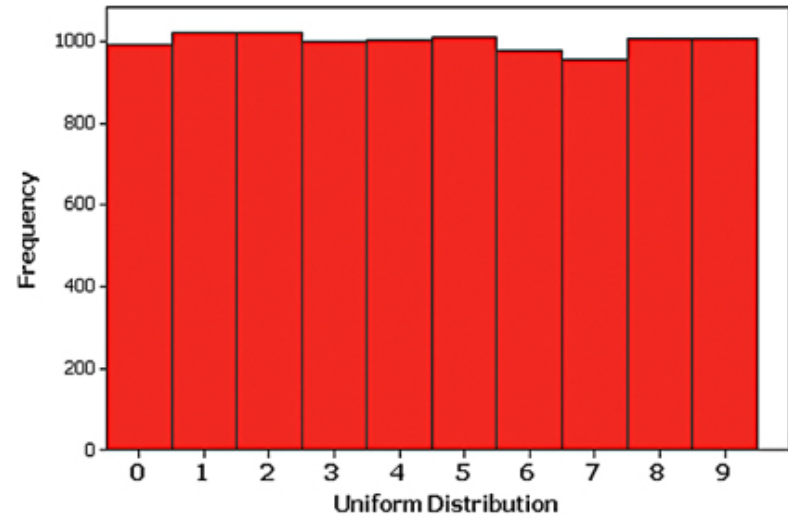
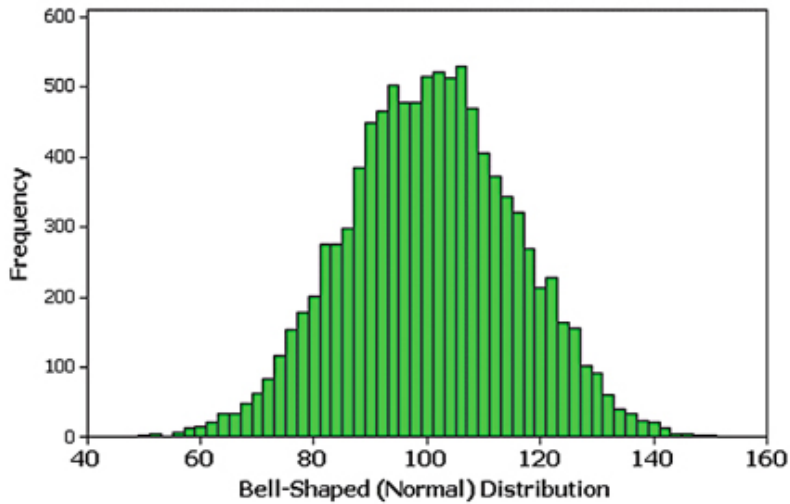


Critical Thinking Interpreting Histograms

Explore the data by analyzing the histogram to see what can be learned about “**CVDOT**”:

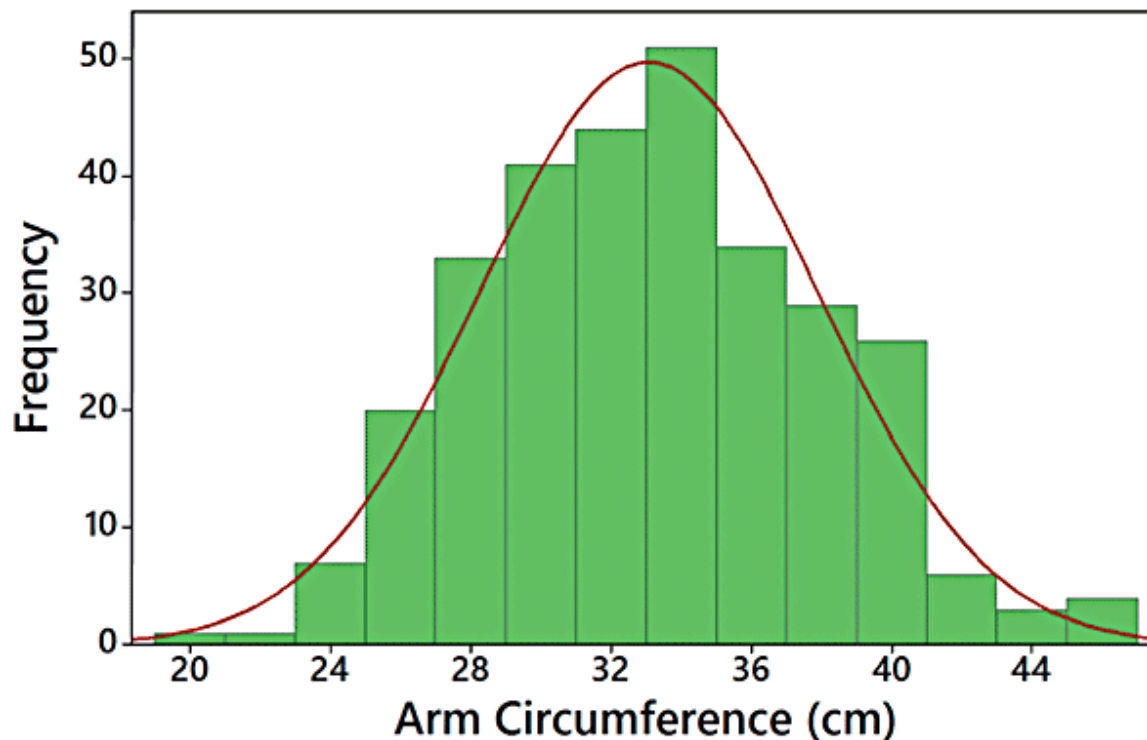
- the **C**enter of the data,
- the **V**ariation,
- the shape of the **D**istribution,
- whether there are any **O**utliers,
- and **T**ime.

Common Distribution Shapes



Normal Distribution

Because this histogram is roughly bell-shaped, we say that the data have a **normal distribution**.



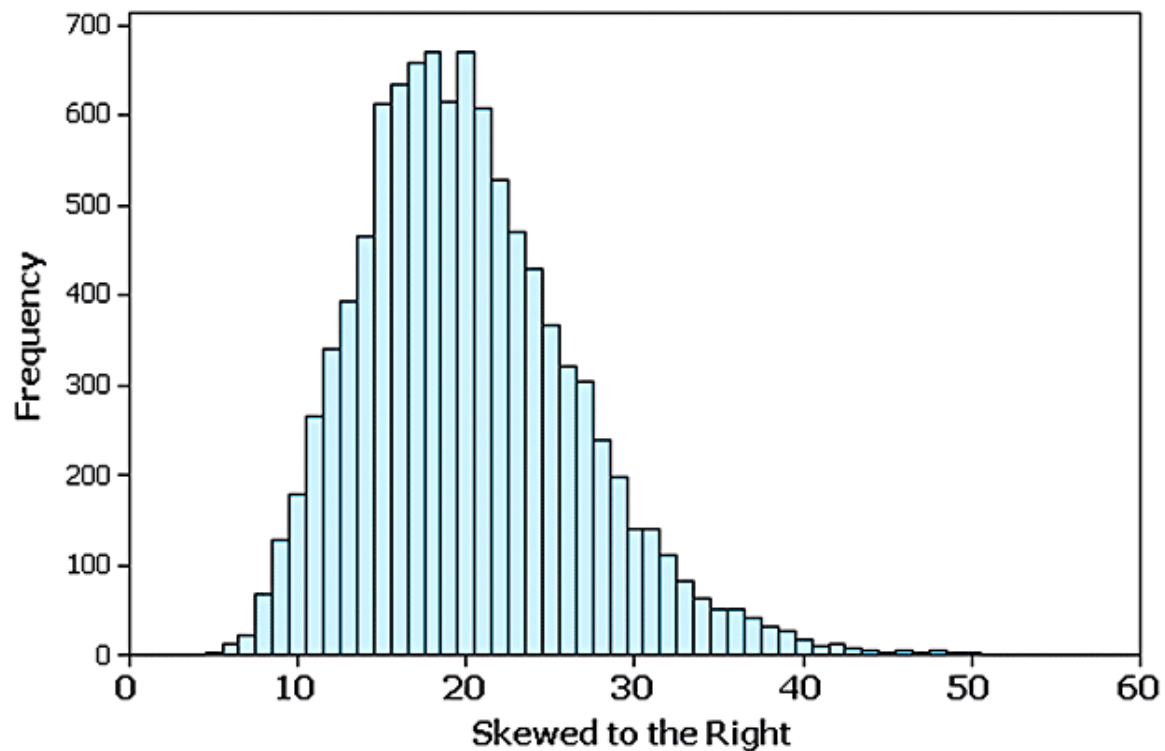
Skewness (1 of 3)

- **Skewness**

- A distribution of data is **skewed** if it is not symmetric and extends more to one side than to the other.

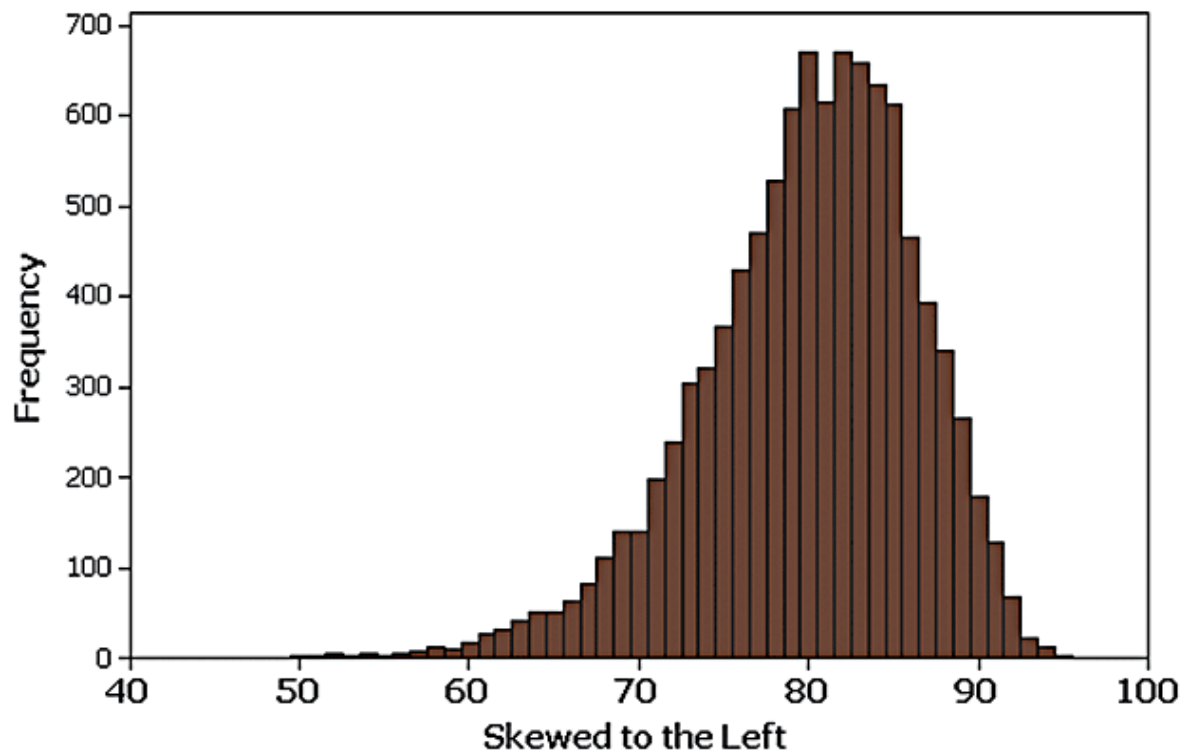
Skewness (2 of 3)

Data **skewed to the right (positively skewed)** have a longer right tail.



Skewness (3 of 3)

Data **skewed to the left (negative skewed)** have a longer left tail.



Assessing Normality with Normal Quantile Plots (1 of 5)

Criteria for Assessing Normality with a Normal Quantile Plot

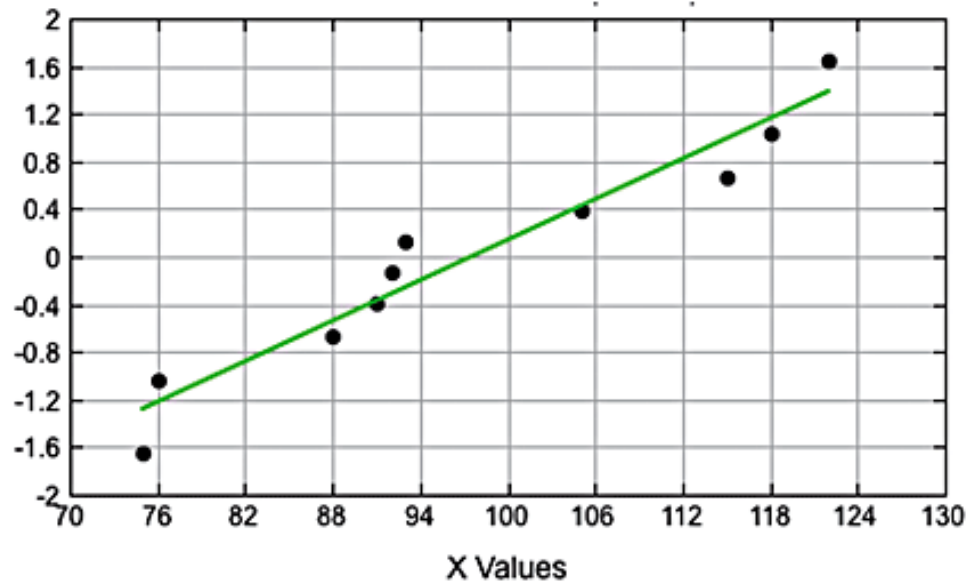
- **Normal Distribution:** The pattern of the points in the normal quantile plot is reasonably close to a straight line, and the points do not show some systematic pattern that is not a straight-line pattern.

Assessing Normality with Normal Quantile Plots (2 of 5)

Criteria for Assessing Normality with a Normal Quantile Plot

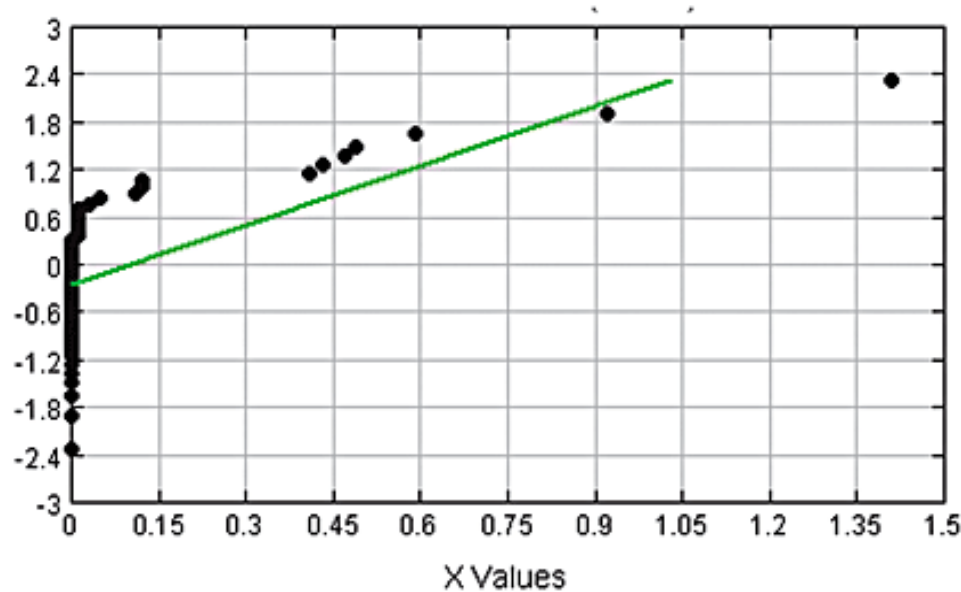
- **Not a Normal Distribution:** The population distribution is **not** normal if the normal quantile plot has either or both of these two conditions:
 - The points do not lie reasonably close to a straight-line pattern.
 - The points show some systematic pattern that is not a straight-line pattern.

Assessing Normality with Normal Quantile Plots (3 of 5)



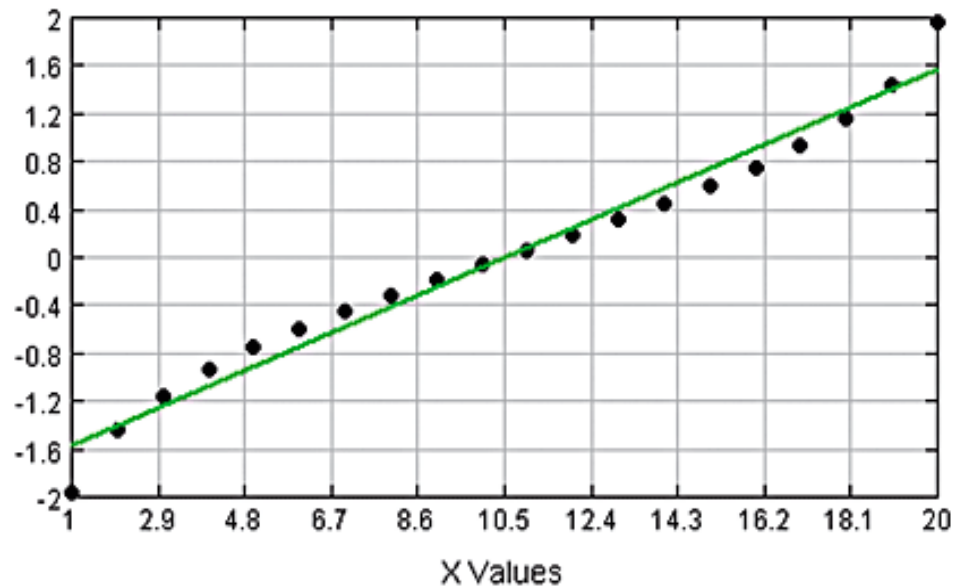
Normal Distribution: The points are reasonably close to a straight-line pattern, and there is no other systematic pattern that is not a straight-line pattern.

Assessing Normality with Normal Quantile Plots (4 of 5)



Not a Normal Distribution: The points do not lie reasonably close to a straight line.

Assessing Normality with Normal Quantile Plots (5 of 5)



Not a Normal Distribution: The points show a systematic pattern that is not a straight-line pattern.