8-1 Residents in a particular community are polled to obtain their religious affiliation and their opinion on a proposed bill to ban smoking in public restaurants. Table 8-3 is constructed from the data.
(a) Add the row totals, column totals, and grand total to the contingency table displayed as Table 8-3.
(b) What proportion of residents are Catholic?
(c) What proportion of residents are not neutral toward the bill?
(d) What proportion of Protestants are against the bill?
(e) What proportion of residents are Jewish among those residents who are in favor of the bill?
(f) What proportion of Catholics are either against the bill or neutral toward the bill?
(g) What proportion of residents are either Protestant or Catholic among those residents who are against the bill?
(h) Complete the construction of the contingency table of relative frequencies to compare the distribution of opinions about the bill among the different religions; then complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

<table>
<thead>
<tr>
<th>Religion</th>
<th>Yes</th>
<th>No</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protestant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catholic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(i) From the stacked bar chart in part (h), do you think a relationship might exist, or do you think religion and opinion about the bill are independent?

(j) If you think a relationship exists, describe it from the stacked bar chart in part (h), if you think religion and opinion about the bill are independent, say why.
(k) Complete the construction of the contingency table of relative frequencies to compare the distribution of different religions among the opinions about the bill, then, complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

<table>
<thead>
<tr>
<th>Religion</th>
<th>Yes</th>
<th>No</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protestant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catholic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(l) From the stacked bar chart in part (k), do you think a relationship might exist, or do you think religion and opinion about the bill are independent?

(m) If you think a relationship exists, describe it from the stacked bar chart in part (k), if you think religion and opinion about the bill are independent, say why.

(n) Complete the construction of the pie chart displaying the relative frequencies for different opinions about the bill. Does the pie chart provide the same information as a stacked bar chart?

(o) Would it be appropriate to construct a scatter plot or contiguous box plots with this data? Why or why not?

(p) Could either of the two variables in this data be treated as qualitative-ordinal?
8-2 Employees in a large corporation are surveyed in order to record information about their smoking habits and their type of job. Table 8-4 is constructed from the data.

(a) Add the row totals, column totals, and grand total to the contingency table displayed as Table 8-4.

(b) What proportion of employees surveyed are executives?

(c) What proportion of employees surveyed are smokers?

(d) What proportion of nonsmokers surveyed are secretaries?

(e) What proportion of salesmen surveyed are heavy smokers?

(f) What proportion of light smokers surveyed are not executives?

(g) What proportion of secretaries surveyed are either nonsmokers or light smokers?

(h) Complete the construction of the contingency table of relative frequencies to compare the distribution of smoking habits among the different job types; then complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

(i) From the stacked bar chart in part (h), do you think a relationship might exist, or do you think smoking habits and job type are independent?

(j) If you think a relationship exists, describe it from the stacked bar chart in part (h); if you think smoking habits and job type are independent, say why.

---

**Table 8-4**

<table>
<thead>
<tr>
<th>Smoking Habits</th>
<th>Job Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Secretary Salesman Executive</td>
</tr>
<tr>
<td>Nonsmoker</td>
<td>33</td>
</tr>
<tr>
<td>Light Smoker</td>
<td>32</td>
</tr>
<tr>
<td>Heavy Smoker</td>
<td>35</td>
</tr>
</tbody>
</table>
8-2 - continued

(k) Complete the construction of the contingency table of relative frequencies to compare the distribution of different job types among the different smoking habits; then, complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

(l) From the stacked bar chart in part (k), do you think a relationship might exist, or do you think smoking habits and job type are independent?

(m) If you think a relationship exists, describe it from the stacked bar chart in part (k); if you think smoking habits and job type are independent, say why.

(n) Complete the construction of the pie chart displaying the relative frequencies for smoking habits. Does the pie chart provide the same information as a stacked bar chart?

(o) Would it be appropriate to construct a scatter plot or contiguous box plots with this data? Why or why not?

(p) Could either of the two variables in this data be treated as qualitative-ordinal?
8-3 A survey of 230 households in Whitown and 285 households from Hicksville was conducted in order to find out which households use a new brand of toothpaste. Among the Whitown households surveyed, 133 were found to use the new brand of toothpaste, and among the Hicksville households surveyed, 141 were found to use the new brand of toothpaste.

(a) Complete the construction of a contingency table which contains the row totals, column totals, and grand total, with rows labeled by the names of the two cities and columns labeled "Yes" or "No" indicating whether or not a household uses the new brand of toothpaste.

(b) Decide whether each of the two variables in the contingency table should be considered quantitative, qualitative-ordinal, qualitative-nominal, or qualitative-dichotomous.

(c) Is it proper to say that we want to study the difference in proportion of households using the new toothpaste between Whitown and Hicksville? If not, why not?

(d) Is it proper to say that we want to study the relationship between households using the new toothpaste in Whitown and Hicksville? If not, why not?

(e) Is it proper to say that we want to study the difference between city and use of the new toothpaste? If not, why not?

(f) Is it proper to say that we want to study the relationship between city and use of the new toothpaste? If not, why not?

(g) Complete the construction of the contingency table of relative frequencies to compare the distribution of toothpaste use between the two cities, then, complete the construction of the corresponding stacked bar chart and scale each bar to a height representing 100%.
(h) What does the stacked bar chart constructed in part (g) appear to suggest about use of the new toothpaste in the two cities?

(i) Complete the construction of the contingency table of relative frequencies to compare the distribution of cities between households using the new toothpaste and households not using the new toothpaste, then complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

(j) The stacked bar charts constructed in parts (g) and (i) are two different ways of displaying the same data. Is one preferable? If yes, why? If no, why not?

8-4 A survey of teenage drivers was conducted in a state. Among 160 males surveyed, 36 are found to have been involved in at least one automobile accident; among 125 females surveyed, 21 are found to have been involved in at least one accident.

(a) Complete the construction of a contingency table which contains the row totals, column totals, and grand total, with rows labeled by the two sexes and columns labeled "Yes" or "No" indicating whether or not a teenager was involved in at least one automobile accident.

(b) Decide whether each of the two variables in the contingency table should be considered quantitative, qualitative-ordinal, qualitative-nominal, or qualitative-dichotomous.

(c) Is it proper to say that we want to study the difference between automobile accidents and sex of a teenage driver? If not, why not?

(d) Is it proper to say that we want to study the relationship between automobile accidents and sex of a teenage driver? If not, why not?
8-4 - continued

(e) Is it proper to say that we want to study the difference in proportion of teenagers involved in at least one automobile accident between males and females? If not, why not?

(f) Is it proper to say that we want to study the relationship between automobile accidents and teenage males? If not, why not?

(g) Complete the construction of the contingency table of relative frequencies to compare the distribution of automobile accidents between male and female teenage drivers; then, complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

(h) What does the stacked bar chart constructed in part (g) appear to suggest about automobile accidents among male and female teenage drivers?

(i) Complete the construction of the contingency table of relative frequencies to compare the distribution of male and female teenage drivers between those involved in at least one automobile accident and those involved in no automobile accidents; then, complete the construction of the corresponding stacked bar chart, and scale each bar to a height representing 100%.

(j) The stacked bar charts constructed in parts (g) and (i) are two different ways of displaying the same data. Is one preferable? If yes, why? If no, why not?
The stacked bar chart displayed as Figure 8-3 was constructed from a group of high school students. Each student was asked whether or not mathematics was enjoyable and whether or not classical music was enjoyable.

(a) From the stacked bar chart, describe what relationship appears to exist between the variables "enjoyment of mathematics" and "enjoyment of classical music".

(b) Give two different examples of what this stacked bar chart might have looked like if the variables "enjoyment of mathematics" and "enjoyment of classical music" were independent.

(c) Suppose you are told that among the group of high school students surveyed, there were 240 who enjoyed classical music and 160 who did not enjoy classical music. Complete the construction of a contingency table which includes row and column totals, with "enjoyment of mathematics" as the rows and "enjoyment of classical music" as the columns.
The stacked bar chart displayed as Figure 8-4 was constructed from a group of high school students. Each student was asked whether or not mathematics was enjoyable and whether or not writing essays was enjoyable.

(a) From the stacked bar chart, describe what relationship appears to exist between the variables "enjoyment of mathematics" and "enjoyment of writing essays".

(b) Give two different examples of what this stacked bar chart might have looked like if the variables "enjoyment of mathematics" and "enjoyment of writing essays" were independent.

(c) Suppose you are told that among the group of high school students surveyed, there were 360 who enjoyed writing essays and 240 who did not enjoy writing essays. Construct a contingency table which includes row and column totals, with "enjoyment of mathematics" as the rows and "enjoyment of writing essays" as the columns.
8-7 Two brands of ointment labeled X and Y are available to treat a skin rash. Table 8-5 is constructed after each person in a group of people with the rash is treated with ointment X, each person in another group of people with the rash is treated with ointment Y, and whether or not each person is cured is recorded.

(a) After adding the row totals, column totals, and grand total to Table 8-5, complete the construction of the stacked bar chart to compare the distribution of cures and non-cures between ointments, and scale each bar to a height representing 100%.

(b) Based on the stacked bar chart constructed in part (a), which ointment would you be more inclined to select, if you needed to treat the rash? Why?

(c) Complete the construction of the stacked bar chart to compare the distribution of the distribution of ointments between those who were cured and those who were not, and scale each bar to a height representing 100%.

(d) From the stacked bar chart in part (c), a friend finds the proportion of each ointment used among those who were cured and tells you that you should select the ointment for which this proportion is higher. Which ointment is this, and how would you explain to your friend why this ointment is not the best choice?

(e) The stacked bar charts constructed in parts (a) and (c) are two different ways of displaying the same data. Is one preferable? If yes, why? If no, why not?

Table 8-5
Contingency Table for Exercise 8-7

<table>
<thead>
<tr>
<th>Rash Cured</th>
<th>Ointment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Yes</td>
<td>105</td>
</tr>
<tr>
<td>No</td>
<td>95</td>
</tr>
</tbody>
</table>
Two types of medication labeled Standard and New are available to provide relief from cold symptoms. Table 8-6 is constructed after each person in a group of people with a cold is treated with the Standard medication, each person in another group of people with a cold is treated with the New medication, and whether or not each person felt relief is recorded.

(a) After adding the row totals, column totals, and grand total to Table 8-6, complete the construction of the stacked bar chart to compare the distribution of relief and non-relief between medications, and scale each bar to a height representing 100%.

(b) Based on the stacked bar chart constructed in part (a), which medication would you be more inclined to select, if you needed relief from cold symptoms? Why?

(c) Complete the construction of the stacked bar chart to compare the distribution of the distribution of medications between those who found relief and those who did not, and scale each bar to a height representing 100%.

(d) From the stacked bar chart in part (c), a friend finds the proportion of each medication used among those who found relief and tells you that you should select the medication for which this proportion is higher. Which medication is this, and how would you explain to your friend why this medication is not the best choice?

(e) The stacked bar charts constructed in parts (a) and (c) are two different ways of displaying the same data. Is one preferable? If yes, why? If no, why not?
8.9 In Exercise 4-1, the weight of chocolate was recorded for each of several of chocolates produced by the Sweetuthe Company at two locations, one on the east coast and one on the west coast; the five-number summaries displayed below were then obtained. In Exercise 6-1, a dot plot and stem-and-leaf display were constructed for each location.

<table>
<thead>
<tr>
<th>East Coast Five-Number Summary</th>
<th>West Coast Five-Number Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.96, 4.01, 4.105, 4.18, 4.26</td>
<td>3.90, 3.935, 3.97, 4.10, 4.40</td>
</tr>
</tbody>
</table>

For each location, identify all potential outliers.

8.10 In Exercise 4-2, each of two printing presses is kept running for eight hours on each of several days, and the number of stops necessary to correct a paper jam was recorded; the five-number summaries displayed below were then obtained. In Exercise 6-2, a dot plot and stem-and-leaf display were constructed for each press.

<table>
<thead>
<tr>
<th>Left Press Five-Number Summary</th>
<th>Right Press Five-Number Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>10, 22, 26.5, 30, 41</td>
<td>10, 24, 29, 33, 36</td>
</tr>
</tbody>
</table>

For each press, identify all potential outliers.