Refer to News Story 2, “Research shows women harder hit by hangovers” and the accompanying Original Source 2. In the study, 472 men and 758 women, all of whom were college students and alcohol drinkers, were asked about whether they had experienced each of 13 hangover symptoms in the previous year.

1. What population do you think is represented by the sample for this study? Explain.

2. One of the results in the Original Source was “there were only two symptoms that men experienced more often than women: vomiting (men: 50%; women: 44%; chi-square statistic = 4.7, p = .031) and sweating more than usual (men: 34%; women: 23%; chi-square statistic = 18.9, p < .001).”
   a. State the null hypotheses and alternative hypotheses for each of these two results.
   b. State the conclusion that would be made for each of the two results, both in statistical terms and in the context of the situation.

3. One of the statements in the Original Source was “men and women were equally likely to experience at least one of the hangover symptoms in the past year (men: 89%; women: 87%; chi-square statistic = 1.2, p = .282).”
   a. State the null and alternative hypotheses for this result.
   b. Given what you have learned in this chapter about how to state conclusions, do you agree with the wording of the conclusion, that men and women were equally likely to experience at least one of the hangover symptoms in the past year? If so, explain how you reached that conclusion. If not, rewrite the conclusion using acceptable wording.

4. Participants were asked how many times in the past year they had experienced at least one of the 13 hangover symptoms listed. Responses were categorized as 0 times, 1-2 times, 3-11 times, 12-51 times, and ≥ 52 times. For the purposes of this exercise, responses have been categorized as less than the average of once a month (0-11 times) versus 12 or more times. The accompanying figure shows the computer output for frequency of symptoms categorized in this way versus the categorical variable male, female. We will determine if there is convincing evidence that one of the two sexes is more likely than the other to experience hangover symptoms at least once a month on average.
   a. State the null and alternative hypotheses being tested.
   b. Show how the expected count of 343.27 for the “Male, ≤11” category was computed.
   c. Give the value of the chi-square statistic and the p-value, and make a conclusion. State the conclusion in statistical terms and in the context of the situation.
Expected counts are printed below observed counts

<table>
<thead>
<tr>
<th></th>
<th>≤11</th>
<th>≥12</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>326</td>
<td>140</td>
<td>466</td>
</tr>
<tr>
<td>Female</td>
<td>569</td>
<td>180</td>
<td>749</td>
</tr>
<tr>
<td>Total</td>
<td>895</td>
<td>320</td>
<td>1215</td>
</tr>
</tbody>
</table>

Chi-square = 0.869 + 2.429 + 
.540 + 1.511 = 5.350

DF = 1, P-Value = 0.021