SPSS EXERCISES - CHAPTER 5

For questions 1 and 2, suppose a computer software program such as SPSS performs a chi-square test and produces a p-value of .026.

1. Should the null-hypothesis be accepted or rejected
   a. at the $\alpha=.01$ level of significance?
   b. at the $\alpha=.05$ level of significance?
   c. at the $\alpha=.1$ level of significance?
2. What is the probability of making a Type 1 error if the null hypothesis is rejected?

Consider data collected from a random selection of public libraries indicating that, of a sample of 300 books, 175 are non-fiction and 125 are fiction. Input this data into SPSS to use for questions 3 and 4.

3. Perform a one-variable chi-square test based upon equal expected frequencies for the number of fiction and non-fiction books.
   a. How many degrees of freedom does the test use? Why?
   b. What is the value of $\chi^2_{\text{calc}}$?
   c. What is the value of $p$?
4. Write a short summary of the results for the test conducted for question #3.

Consider a study investigating the consumption of popcorn at movie theaters. Researchers expect that no relationship exists between the rating of the movie viewed (G, PG, PG-13, R, NC-17) and theater patrons’ popcorn purchases. The following crosstabulation displays observed values based upon interviews of randomly selected individuals exiting randomly selected movie theaters. Input this data into SPSS to use for questions 5-7.

<table>
<thead>
<tr>
<th>popcorn?</th>
<th>rating</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>G</td>
<td>PG</td>
<td>PG-13</td>
<td>R</td>
<td>NC-17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>45</td>
<td>35</td>
<td>38</td>
<td>58</td>
<td>12</td>
<td>188</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>28</td>
<td>46</td>
<td>48</td>
<td>36</td>
<td>10</td>
<td>168</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Sigma$</td>
<td>73</td>
<td>81</td>
<td>86</td>
<td>94</td>
<td>22</td>
<td>356</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Use SPSS to perform a chi-square test based upon the hypothesis that equal percentages of those who do and do not buy popcorn view movies with each rating.
   a. How many degrees of freedom does the test use? Why?
   b. What is the value of $\chi^2_{\text{calc}}$?
   c. What is the value of $p$?
6. Is it necessary to further investigate the source of differences within the data? If so, what source of difference exists?

7. Write a short summary of the results for the test conducted for question #8.

ANSWERS

1. a. no           
   b. yes          
   c. yes

2. .026

3. a. 1; K-1=2-1=1  
   b. 8.333         
   c. .004

4. A test of significance produced a $\chi^2$ of 8.333 and a p of .004, indicating that the numbers of fiction books (n=125) and non-fiction books (n=175) in the sample indicated that these values differ significantly from the expected values.

5. a. 4; (R-1)(C-1)=(2-1)(5-1)=4
   b. 10.857        
   c. 0.28

6. yes; MANY CORRECT ANSWERS EXIST. ONE reason for the significant results is the distinction between the low frequency associated NC-17 ratings and the frequencies for other ratings.

7. Significant differences exist between the numbers of people who fall into each combination of popcorn and rating categories ($\chi^2=10.857$, p=.028). A one-variable $\chi^2$ test identified the distinction between the number of people in the NC-17 category and other rating categories as one reason for these significant results ($\chi^2=4.77$, p=.000).