STAT 571, Solution for Assignment #12

December 8, 2003

1. $H_0: P_M = P_T = P_W = P_R = P_F = P_Sa = P_{Sn} = 1/7$
   $H_A: \text{Not} H_0.$

   Observed values:
<table>
<thead>
<tr>
<th>Saturday</th>
<th>Sunday</th>
<th>Mon-Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>87</td>
<td>67</td>
<td>246</td>
</tr>
</tbody>
</table>

   Expected values:
<table>
<thead>
<tr>
<th>Saturday</th>
<th>Sunday</th>
<th>Mon-Fri</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.143</td>
<td>57.143</td>
<td>285.714</td>
</tr>
</tbody>
</table>

   \[
   \chi^2 = \sum \frac{(\text{observed} - \text{expected})^2}{\text{expected}}
   \]

   \[
   = 22.82
   \]

   Compared it with $\chi^2$ distribution, we get p-value < 0.001. We have very strong evidence to reject $H_0.$

2. $H_0: P_A = P_B = P_C = p$
   $H_A: \text{Not} H_0.$

   Since $p$ is unknown, we estimate it by

   \[
   \hat{p} = \frac{19 + 44 + 27}{48 + 85 + 70} = 0.44335.
   \]

   Observed values:
<table>
<thead>
<tr>
<th>AS</th>
<th>AF</th>
<th>BS</th>
<th>BF</th>
<th>CS</th>
<th>CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>29</td>
<td>44</td>
<td>41</td>
<td>27</td>
<td>43</td>
</tr>
</tbody>
</table>

   Expected values:
<table>
<thead>
<tr>
<th>AS</th>
<th>AF</th>
<th>BS</th>
<th>BF</th>
<th>CS</th>
<th>CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.28</td>
<td>26.72</td>
<td>37.68</td>
<td>47.32</td>
<td>31.03</td>
<td>38.97</td>
</tr>
</tbody>
</table>
\[
\chi^2 = \sum_{allobs} \frac{(observed - expected)^2}{expected} = 3.283
\]

Compared it with \(\chi^2\) distribution, we get p-value > 0.25. We have no evidence to reject \(H_0\).