

## Math 10 - Homework Chapter 11

1. A bicycle safety organization claims that fatal bicycle accidents are uniformly distributed throughout the week. The table shows the day of the week for which 911 randomly selected fatal bicycle accidents occurred. At  $\alpha = 0.10$ , can you reject the claim that the distribution is uniform?

| <p><b>(a) (DESIGN)</b> State your Hypothesis</p>   | <p><b>(d) (DATA)</b> Conduct the test and <b>circle</b> your decision</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 2px;">Survey</th> <th style="padding: 2px;">Observe</th> <th style="padding: 2px;"><math>p_i</math></th> <th style="padding: 2px;">Expected</th> <th style="padding: 2px;">ChiSq</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Sunday</td> <td style="padding: 2px;">118</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Monday</td> <td style="padding: 2px;">119</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Tuesday</td> <td style="padding: 2px;">127</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Wednesday</td> <td style="padding: 2px;">137</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Thursday</td> <td style="padding: 2px;">129</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Friday</td> <td style="padding: 2px;">146</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Saturday</td> <td style="padding: 2px;">135</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"><b>Total</b></td> <td style="padding: 2px;"><b>911</b></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> </tbody> </table> | Survey | Observe  | $p_i$ | Expected | ChiSq | Sunday | 118 |  |  |  | Monday | 119 |  |  |  | Tuesday | 127 |  |  |  | Wednesday | 137 |  |  |  | Thursday | 129 |  |  |  | Friday | 146 |  |  |  | Saturday | 135 |  |  |  | <b>Total</b> | <b>911</b> |  |  |  |
|--|---|--------|----------|-------|----------|-------|--------|-----|--|--|--|--------|-----|--|--|--|---------|-----|--|--|--|-----------|-----|--|--|--|----------|-----|--|--|--|--------|-----|--|--|--|----------|-----|--|--|--|--------------|------------|--|--|--|
| Survey   | Observe   | $p_i$  | Expected | ChiSq |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Sunday   | 118   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Monday   | 119   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Tuesday  | 127   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Wednesday  | 137   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Thursday   | 129   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Friday   | 146   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| Saturday   | 135   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| <b>Total</b>   | <b>911</b>  |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| <p><b>(b) (DESIGN)</b> State Significance Level of the test and explain what it means.</p>                       | <p style="text-align: center;">Reject <math>H_0</math>      Fail to Reject <math>H_0</math></p>   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |
| <p><b>(c) (DESIGN)</b> Determine the statistical model .<br/>Determine decision rule (critical value method)</p> | <p><b>(e) (CONCLUSION)</b> State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision.</p>   |        |          |       |          |       |        |     |  |  |  |        |     |  |  |  |         |     |  |  |  |           |     |  |  |  |          |     |  |  |  |        |     |  |  |  |          |     |  |  |  |              |            |  |  |  |

2. Results from a survey five years ago asking where coffee drinkers typically drink their first cup of coffee are shown in the graph. To determine whether this distribution has changed, you randomly select 581 coffee drinkers and ask each where they typically drink their first cup of coffee. The results are shown in the table. Can you conclude that there has been a change in the claimed or expected distribution? Use  $\alpha = 0.05$ .

| <p><b>(a) (DESIGN)</b> State your Hypothesis</p>   | <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p><b>Coffee in the Morning</b><br/>Where do coffee drinkers enjoy their first cup on a typical day:</p> <ul style="list-style-type: none"> <li>At home: 70%</li> <li>At workplace: 17%</li> <li>While commuting: 8%</li> <li>Restaurant/other: 5%</li> </ul> </div> <div style="width: 35%; padding-left: 10px;"> <p><b>(d) (DATA)</b><br/>Conduct the test and <b>circle</b> your decision</p> </div> </div>  |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
|--|--|--------|----------|-------|----------|-------|------|-----|--|--|--|------|-----|--|--|--|---------|----|--|--|--|------------|----|--|--|--|--------------|------------|--|--|--|
| <p><b>(b) (DESIGN)</b> State Significance Level of the test and explain what it means.</p>                       | <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Survey</th> <th>Observe</th> <th><math>p_i</math></th> <th>Expected</th> <th>ChiSq</th> </tr> </thead> <tbody> <tr> <td>Home</td> <td>389</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Work</td> <td>110</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Commute</td> <td>55</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Rest/Other</td> <td>27</td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>Total</b></td> <td><b>581</b></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Survey | Observe  | $p_i$ | Expected | ChiSq | Home | 389 |  |  |  | Work | 110 |  |  |  | Commute | 55 |  |  |  | Rest/Other | 27 |  |  |  | <b>Total</b> | <b>581</b> |  |  |  |
| Survey   | Observe  | $p_i$  | Expected | ChiSq |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| Home   | 389  |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| Work   | 110  |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| Commute  | 55   |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| Rest/Other   | 27   |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| <b>Total</b>   | <b>581</b>   |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |
| <p><b>(c) (DESIGN)</b> Determine the statistical model .<br/>Determine decision rule (critical value method)</p> | <p style="text-align: center;">Reject <math>H_0</math>      Fail to Reject <math>H_0</math></p> <p><b>(e) (CONCLUSION)</b> State your overall conclusion in language that is clear, relates to the original problem and is consistent with your decision</p>   |        |          |       |          |       |      |     |  |  |  |      |     |  |  |  |         |    |  |  |  |            |    |  |  |  |              |            |  |  |  |

3. In a recent SurveyUSA poll, 500 Americans adults were asked if marijuana should be legalized. The results of the poll were cross tabulated as shown in the contingency tables below. Conduct **two** tests for independence to determine if opinion about legalization of marijuana is dependent on gender or age

|                            | <b>Male</b> | <b>Female</b> |
|----------------------------|-------------|---------------|
| <b>Should be Legal</b>     | 123         | 90            |
| <b>Should Not be Legal</b> | 127         | 160           |

|                            | <b>18-34</b> | <b>35-54</b> | <b>55+</b> |
|----------------------------|--------------|--------------|------------|
| <b>Should be Legal</b>     | 95           | 83           | 48         |
| <b>Should Not be Legal</b> | 65           | 126          | 83         |