1. A breeder of rabbits claims that he can breed rabbits yielding a mean weight of greater than 58 ounces. The weights of the rabbits are normally distributed with a standard deviation of 3 ounces. The breeder takes a random sample of 12 rabbits and the results are shown below. Can we conclude that the breeder is breeding rabbits yielding a mean weight that is greater than 58 ounces? (Use the 5% level of significance.)

57.8  60.2  59.9  61.3  56.5  60.8  59.3  58.6  57.2  58.3  56.3  57.4

a) Is this a two or one tail test?
b) If a one tail test, which side is the tail on?
c) State the null and alternative hypothesis.
d) Determine the rejection region.
e) Determine the test statistic.
f) What is the p-value?
g) What conclusion can you draw from your findings?

2. A skier is trying to determine his mean time for a certain downhill course. He selected a random sample of ten of his runs on this course and has listed his results below. Determine the confidence interval for the mean time for this downhill course at 95% confidence.

10.2  11.6  12.3  10.7  11.4  10.5  12.8  11.5  10.0  10.8

3. A ski coach claims that she can train beginning skiers for 3 weeks so that at the end of the program they will finish a certain downhill course in less than 13 minutes. She has chosen a random sample of 10 from her latest group and their results are listed below. On the basis of this evidence, is the true mean time significantly less than 13 minutes? (Use the 2.5% level of significance.)

12.9  12.5  12.2  11.8  11.5  12.3  11.6  12.6  12.0  12.7

a) Is this a two or one tail test?
b) If a one tail test, which side is the tail on?
c) State the null and alternative hypothesis.
d) Determine the rejection region.
e) Determine the test statistic.
f) What is the p-value?
g) What conclusion can you draw from your findings?

Academic Success Centre  www.rrc.mb.ca/asc
These questions were compiled by Michael Reimer for the Academic Success Centre.
4. A coffee company wants to estimate the true proportion in the Canadian population that drinks its brand. How many individuals should be surveyed to be 99% confident of having the true proportion of people drinking the brand estimated to within 0.018?

5. A recent article in the Winnipeg Free Press reported that a job awaits only one in three new college graduates. The major reasons given were an overabundance of college graduates and a weak economy. A survey of 200 recent graduates from RRC revealed that 80 students had jobs. At the 2% level of significance, can we conclude that a larger proportion of students at RRC have jobs versus what the Winnipeg Free Press has reported?

   a) Is this a two or one tail test?
   b) If a one tail test, which side is the tail on?
   c) State the null and alternative hypothesis.
   d) Determine the rejection region.
   e) Determine the test statistic.
   f) What is the p-value?
   g) What conclusion can you draw from your findings?

6. A new company is looking at marketing a new product to help adult learners between the ages of 25 and 55. The company wanted to find out how much time these students spent studying in a week. The company did a survey of 500 of these students at a local college. The results of the survey are listed below:

<table>
<thead>
<tr>
<th>Hours</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 up to 2</td>
<td>45</td>
</tr>
<tr>
<td>2 up to 4</td>
<td>100</td>
</tr>
<tr>
<td>4 up to 6</td>
<td>120</td>
</tr>
<tr>
<td>6 up to 8</td>
<td>135</td>
</tr>
<tr>
<td>8 up to 10</td>
<td>70</td>
</tr>
<tr>
<td>10 up to 12</td>
<td>30</td>
</tr>
</tbody>
</table>

The company estimates that there are 500,000 adult learners between the ages of 25 and 55. Their target market is those students who study less than 4 hours a week. Estimate with 95% confidence the number of adult learners who would be interested in this new product.
7. You have been asked to check to see if the bottles being filled by Abe’s machine are greater than the bottles that are being filled by Bev’s machine. You select a sample of 8 bottles filled by Abe and 6 bottles filled by Bev. The results are listed below. At the 5% level of significance, is the mean weight of the bottles filled by Abe’s machine greater than the mean weight of the bottles filled by Bev’s machine?

<table>
<thead>
<tr>
<th></th>
<th>8.4</th>
<th>8.2</th>
<th>8.3</th>
<th>8.5</th>
<th>8.1</th>
<th>8.4</th>
<th>8.0</th>
<th>8.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bev</td>
<td>7.9</td>
<td>8.0</td>
<td>7.8</td>
<td>8.1</td>
<td>7.9</td>
<td>7.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) Is this a two or one tail test?
b) If a one tail test, which side is the tail on?
c) State the null and alternative hypothesis.
d) Determine the rejection region.
e) Determine the test statistic.
f) What is the p-value?
g) What conclusion can you draw from your findings?
h) Estimate the mean with a 90% level of confidence.

8. A survey is to be conducted in Canada to measure the effect of the change in environment on exchange students. One of the facets of the study is a comparison of student weights before arrival on campus with weights one year after arrival. It is hypothesized that the richer Canadian food will cause an increase in weight. The 1% level of significance is to be used. A random sample of 11 foreign students is chosen for the study and their results are listed below. Has the richer Canadian food caused an increase in the foreign students’ weights?

<table>
<thead>
<tr>
<th>Student</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>124</td>
<td>142</td>
</tr>
<tr>
<td>2</td>
<td>157</td>
<td>157</td>
</tr>
<tr>
<td>3</td>
<td>98</td>
<td>96</td>
</tr>
<tr>
<td>4</td>
<td>190</td>
<td>212</td>
</tr>
<tr>
<td>5</td>
<td>103</td>
<td>116</td>
</tr>
<tr>
<td>6</td>
<td>135</td>
<td>134</td>
</tr>
<tr>
<td>7</td>
<td>149</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>176</td>
<td>184</td>
</tr>
<tr>
<td>9</td>
<td>200</td>
<td>209</td>
</tr>
<tr>
<td>10</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>11</td>
<td>256</td>
<td>269</td>
</tr>
</tbody>
</table>

a) Is this a two or one tail test?
b) If a one tail test, which side is the tail on?
c) State the null and alternative hypothesis.
d) Determine the rejection region.
e) Determine the test statistic.
f) What is the p-value?
g) What conclusion can you draw from your findings?
h) Estimate the mean with 90% confidence.
9. A survey was conducted to compare the proportions of males and females who favour government assistance for child care. It was found that, among 64 males interviewed, 40 favoured assistance, and among 100 females, 70 favoured assistance. At the 5% level of significance, are the true proportions among males and females in the population who favour government assistance for child care significantly different?

   a) Is this a two or one tail test?
   b) If a one tail test, which side is the tail on?
   c) State the null and alternative hypothesis.
   d) Determine the rejection region.
   e) Determine the test statistic.
   f) What is the p-value?
   g) What conclusion can you draw from your findings?
   h) Estimate the proportion with a 90% level of confidence.