4. Four individuals with high levels of cholesterol went on a special crash diet, avoiding high cholesterol foods and taking special supplements. Their total cholesterol levels before and after the diets were as follows:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Before the diet</th>
<th>After the diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>287</td>
<td>255</td>
</tr>
<tr>
<td>2</td>
<td>305</td>
<td>269</td>
</tr>
<tr>
<td>3</td>
<td>243</td>
<td>245</td>
</tr>
<tr>
<td>4</td>
<td>309</td>
<td>247</td>
</tr>
</tbody>
</table>

Using the 5% level of statistical significance, was there a statistically significant change in cholesterol (please show your work)? How would you explain your conclusions to someone who has never taken a course in statistics?

5. Five people who were convicted of speeding were ordered by the court to attend a workshop. A special device put into their cars kept records of their speeds for two weeks before and after the workshop. The maximum speeds for each person during the two weeks before and the two weeks after the workshop follow:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Before the workshop</th>
<th>After the workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
<td>58</td>
</tr>
<tr>
<td>2</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>70</td>
<td>66</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>60</td>
</tr>
</tbody>
</table>

Using the 5% significance level, should we conclude that people are likely to drive more slowly after such a workshop (please show your work)? Please present your conclusions as you would for a research paper.

6. Twenty students randomly assigned to an experimental group receive an instruction program, 30 in a control group do not. After 6 months, both groups are tested on their knowledge. The experimental group has a mean of 38 on the test (with an estimated population standard division of 2); the control group has a mean of 35 (with an estimated population standard deviation of 5). Using a statistical significance level of .05, what can you conclude (please show your work)? Please explain your conclusions to someone who is not familiar with t-tests.
7. A psychologist theorized that people can hear better when they have just eaten a large meal. Six individuals were randomly assigned to eat either a large meal or a small meal. After eating the meal, their hearing was tested. The hearing ability scores (high numbers indicate greater ability) are given below. Using a statistical significance level of .05, do the results support the theory (please show your work)? Please present your conclusions as you would for a research paper.

<table>
<thead>
<tr>
<th>Big Meal Group</th>
<th>Small Meal Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>Hearing</td>
</tr>
<tr>
<td>1</td>
<td>22</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
</tr>
</tbody>
</table>

8. For each of the following studies, say whether you would use a t test for dependent means or a t-test for independent means.

a) a researcher measures the heights of 40 college students who are the first born in their families and compares the 15 who come from large families to the 25 who come from smaller families.

b) a researcher tests performance on a math skills test of each of 250 individuals before and after they complete a one-day seminar on managing test anxiety.

c) a researcher compares the resting heart rate of 15 individuals who have been taking a particular drug to the resting heart rate of 48 other individuals who have not been taking this drug.