1. Scores on the verbal ability portion of the Graduate Record Examination (GRE) follow a normal distribution with mean 500 and standard deviation 115.

a) Between what two values do the middle 95% of scores fall?

b) If your score is 750, then you did better than what percentage of exam takers?

2. Suppose that 15% of all Cal Poly students ride a bicycle to campus.

a) Is the 15% number a parameter or a statistic? Explain briefly.

Suppose that Josiah takes a random sample of 80 Cal Poly students, and Kellen take a random sample of 160 Cal Poly students.

b) Who is more likely to find that more than 20% of his/her sample rides a bicycle to campus? Explain briefly.

c) Suppose that you take a random sample of Cal Poly students, and you want to use the Central Limit Theorem to conduct probability calculations involving the proportion of your sample who ride a bicycle to campus. How large would your sample have to be, in order for using the Central Limit Theorem to be valid?

3. Have you ever pretended to be talking on your cell phone in order to avoid interacting with people around you? A recent survey conducted by the Pew Research Center during April 26 – May 22, 2011 asked cell phone users about this issue. The survey involved selecting a random sample of 1858 American cell phone users, 13% of whom admitted to faking cell phone call in the past 30 days.

a) Check whether the technical conditions for using a one-proportion z-interval (i.e., a confidence interval based on the normal approximation) are satisfied here.

b) Determine a 99% confidence interval.

c) Write a sentence or two interpreting what this confidence interval reveals.

d) Based only on your confidence interval, would you expect to reject the null hypothesis that 10% of all American cell phone users have faked a cell phone call in the past 30 days, using the .01 significance level? Explain briefly.

e) If you were to reduce the confidence level, how (if at all) would the midpoint and width of this confidence interval change? (Circle your answers; do not bother to explain.)

<table>
<thead>
<tr>
<th>Midpoint:</th>
<th>Larger</th>
<th>No change</th>
<th>Smaller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width:</td>
<td>Wider</td>
<td>No change</td>
<td>Narrower</td>
</tr>
</tbody>
</table>
4. The news website CNN.com regularly posts a poll question that people who view the website can respond to. The following results were posted on January 10, 2012:

<table>
<thead>
<tr>
<th>Read Related Articles</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Often</td>
<td>62% 68413</td>
</tr>
<tr>
<td>Seldom</td>
<td>25% 27873</td>
</tr>
<tr>
<td>Never</td>
<td>13% 14652</td>
</tr>
<tr>
<td>Total votes: 111338</td>
<td></td>
</tr>
<tr>
<td>This is not a scientific poll</td>
<td></td>
</tr>
</tbody>
</table>

a) What is the sample size in this survey?

b) Are the numbers 62%, 25%, and 13% statistics or parameters? (Circle your answer; do not bother to explain.)

| statistics | parameters |


c) Using these data to produce a 99.9% confidence interval for the population proportion of all employed Americans who surf the Web often while on the job produces the interval (.615, .625). Why is this interval so narrow? (Use no more than 6 words in your answer.)

d) Are you very confident that between 61.5% and 62.5% of all employed Americans surf the Web often while on the job? Explain your answer. (Do not perform any calculations.)

5. I once collected data in class on how long (in seconds) it took for a chocolate chip to melt in your mouth and for a peanut butter chip to melt in your mouth. I took the differences in these times (chocolate minus peanut butter) for each person. The sorted data, and a dotplot, for the 31 differences appear below:

-41 -36 -35 -33 -31 -28 -25 -25 -20 -20
-17 -17 -16 -14 -11 -7 -6 -5 -5 -4
-4 -2 1 3 6 15 17 21 30 36
67

a) Explain what the value -41 means in terms of the student who produced that value and his/her melting times.

b) Determine the five-number summary of these differences. (Show how you do these calculations.)
The mean of these 31 differences is -6.65 seconds, and the standard deviation is 23.61 seconds.

c) Conduct a test of whether the sample data provide strong evidence of a difference in melting times of chocolate and peanut butter chips on average. Report the hypotheses, test statistic, and p-value as accurately as you can.

d) Determine and interpret a 95% confidence interval based on the 31 differences.

e) Summarize your conclusion from this analysis.

f) Now suppose that you were to re-do this analysis after removing the outlier value of 67. Indicate how each of the following would change. Circle your answers. Do not bother to explain or perform any calculations.

- Mean: Decrease, Increase, Remain the same
- Standard deviation: Decrease, Increase, Remain the same
- Test statistic: Decrease (more negative), Increase (less negative), Remain the same
- p-value: Decrease, Increase, Remain the same

6. (10 pts) Students in an introductory statistics class were asked how many states they have visited. The following output pertains to the sample results:

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SE Mean</th>
<th>StDev</th>
<th>Minimum</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>states</td>
<td>50</td>
<td>13.36</td>
<td>1.03</td>
<td>7.27</td>
<td>2.00</td>
<td>7.00</td>
<td>12.00</td>
<td>20.00</td>
<td>31.00</td>
</tr>
</tbody>
</table>

a) (3 pts) Determine a 90% confidence interval for the population mean number of states visited among all students at this university.

b) (2 pts) Check and comment on whether the technical conditions of this confidence interval are satisfied.

c) (1 pts) For what proportion of students in the sample is the number of states visited within the interval from a)?

d) (2 pts) Should you expect your answer to c) to be close to 90%? Explain why or why not.

e) (2 pts) Based on your interval, what can you say about the p-value if you were to conduct a two-sided significance test of whether the population mean differs from 10? Explain briefly, without conducting a test or doing new calculations.