Math 227 – Winter 2011 – Project #3

You will use MINITAB 14 and the data given to perform the following.
1.) The cure rate for a standard treatment of a disease is 45%. Dr. Snyder has perfected a primitive treatment which he claims is much better. As evidence, he says that he has used his new treatment on 50 patients with the disease and cured 25 of them. What do you think? Is this new treatment better? Use a 95% confidence interval to answer the question.

2.)"While vast majorities of Americans experience a range of rude behaviors at least occasionally in their daily lives, the one transgression that occurs most often is accompanied by a ring tone: people talking on cell phones in public places in a loud or annoying manner." An ABC news poll was conducted by telephone (Jan. 20-24, 2006) among a random national sample of 1014 adults. Of those sampled, 600 said that they often see people making annoying cell phone calls. Using a 90% confidence interval, estimate the true proportion of American adults that often see people making annoying cell phone calls.

3.) Below is the age of a random sample of 36 students at ELAC.

28	**21**	**30**	**22**	**29**	**26**
24	**29**	**23**	**17**	**33**	**28**
34	**17**	**41**	**18**	**35**	**18**
16	**37**	**32**	**27**	**46**	**31**
25	**34**	**20**	**39**	**21**	**8**
29	**32**	**34**	**33**	**42**	**25**

Construct a 95% confidence interval for the mean age of all students age at ELAC.

4.) Suppose we take a sample of 35 students from Smith University and record their family incomes. Suppose the incomes (in thousands of dollars) are:

28	29	35	42	42	44	50	52	54	56
59	78	84	90	95	101	108	116	121	122
133	150	158	167	235	55	75	89	40	33
45	100	52	65	49					

Construct a 97% confidence interval for the true population mean.

5.) In 1990, 5.8% of job applicants who were tested for drugs failed the test. At the 1% significance level, test the claim that the failure rate is now lower if a simple random sample of 1520 current job applicants results in 58 failures.
Does the result suggest that fewer job applicants fail the drug test?

6.) In September of 2005, an executive of a major oil company claimed that the mean price of regular unleaded gasoline in County X was exactly $3.00. A member of the county board feels that the mean price is less than $3.00. He randomly sampled 36 gas stations and obtained the following data:

3.08	**2.85**	**3.02**	**3.01**	**2.75**	**2.79**	**3.00**	**2.91**	**3.08**	**2.85**	**3.02**	**2.66**
2.79	**3.24**	**3.09**	**3.09**	**2.81**	**2.96**	**3.25**	**2.93**	**2.79**	**3.24**	**2.89**	**2.79**
3.10	**3.09**	**3.05**	**3.12**	**2.93**	**3.00**	**2.73**	**2.86**	**3.10**	**3.09**	**3.01**	**3.11**

Test the hypothesis at the $\alpha = 0.05$ level of significance.

7.) An insurance company is reviewing its current policy rates. When originally setting the rates they believed that the average claim amount was $1,800. They are concerned that the true mean is actually higher than this, because they could potentially lose a lot of money. They randomly select 40 claims, and calculate a sample mean of $1,950 with a standard deviation of $500. Test to see if the insurance company should be concerned at a 0.025 level of significance.

8.) According to the US Department of Education's Office of Educational Technology, 87% of teachers used the Internet to teach in 2000. An educator claims that that percentage has increased from its 2000 level. She randomly samples 400 teachers and discovers that 360 of them have used the Internet in their teaching. Is there significant evidence to support the claim that the percentage of teachers using the Internet in their teaching has increased, at $\alpha = 0.01$ level of significance?

9.) Trying to encourage people to stop driving to campus, UCLA claims that on average it takes people 30 minutes to find a parking space on campus. I don't think it takes so long to find a spot. In fact I have a sample of the last 25 times I drove to campus, and I calculated $\bar{x} = 20$ minutes. Assuming that the time it takes to find a parking spot is normal, and that $\sigma = 6$ minutes, perform a hypothesis test with 0.06 level of significance to see if my claim is correct.

10.) Suppose the Acme Drug Company develops a new drug, designed to prevent colds. The company states that the drug is equally effective for men and women. To test this claim, they choose a simple random sample of 100 women and 200 men. At the end of the study, 38% of the women caught a cold; and 51% of the men caught a cold.

a. Based on these findings, can we reject the company's claim that the drug is equally effective for men and women? Use a 0.05 level of significance.
b. Construct a 95% confidence interval for the given data above.

11.) A nutritionist claims that the proportion of females who consume too much saturated fat is lower than the proportion of males who consume too much saturated fat. In interviews with 600 randomly selected females, she determines that 300 consume too much saturated fat. In interviews with 700 randomly selected males, she determines that 400 consume too much saturated fat, based upon data obtained from the USDA's 1994-1996 Diet and Health Knowledge Survey.
Test the claim that a lower proportion of females than males consume too much saturated fat at the $\alpha = 0.03$ level of significance.

12.) Do employees perform better at work with music playing? Music was turned on during the working hours of a business with 45 employees. There productivity level averaged 5.2 with a standard deviation of 2.4. On a different day the music was turned off and there were 40 workers. The workers' productivity level averaged 4.8 with a standard deviation of 1.2.
a. What can we conclude at the .1 level?
b. Construct a 90% confidence interval for the difference in means.

13.). Blood clotting occurs due to a sequence of chemical reactions. The protein thrombin initiates blood clotting by working with another protein, prothrombin. It is common to measure an individual's blood clotting time through prothrombin time-the time between the start of the thrombin-prothrombin reaction and the formation of the clot. Researchers wanted to study the effect of aspirin on prothrombin time. They randomly selected 10 subjects and measured the prothrombin time (in seconds), first without taking aspirin and again three hours after taking two aspirin tablets. They obtained the following data:

Subject	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
With Aspirin	12.5	12.1	12.2	12.8	12.2	12.6	10.8	11.5	12.1	11.2
Without Aspirin	12.2	12.4	12.7	12.9	12.2	12.2	11.3	10.9	12.1	11.8

Test the claim that aspirin helps the time it takes for a clot to form at the $\alpha = 0.05$ level of significance.
Note: Assume that the data indicate that the differences are approximately normally distributed with no outliers.

14.) Police trainees were seated in a darkened room. Ten different license plates were projected on the screen, one at a time, for 3 seconds each, in 10-second intervals. After the last 10-second interval, the lights were turned on and the police trainees were asked to write down as many of the 10 license plate numbers as possible.A random sample of 15 trainees who took this test where then given a month-long memory training course. They were then retested. The results are shown in the table below.

(A): # plates correctly identified after training.	(B): # plates correctly identified before training.	
6	6	
8	5	
6	6	
7	5	
9	7	
8	5	
9	4	
6	6	
7	7	
5	8	
9	4	
8	5	
6	4	
8	6	
6	7	

a. Test that the memory course improved the trainees' memory at a 0.01 level.
b. Construct a 98% confidence interval. Does the data agree with the hypothesis test?

15.) A researcher wanted to know whether students who do not plan to apply for financial aid score better on the SAT I math test than those who do plan to apply for financial aid. She obtains a random sample of 34 students who do not plan to apply for financial aid and a random sample of 38 students who do plan to apply for financial aid and obtains the following results:

Do not Plan to Apply for Financial Aid	Plan to Apply for Financial Aid
$n_1 = 34$	$n_2 = 38$
$\bar{x}_1 = 550$	$\bar{x}_2 = 500$
$s_1 = 120$	$s_2 = 118$

(a) Test the claim that students who do not apply for financial aid score higher on the SAT math I exam than students who do apply for financial aid at the $\alpha = 0.01$ level of significance.

(b) Construct a 98% confidence interval about $\mu_1 - \mu_2$ and interpret the results.