Math 663-101, Spring 2008

Mid-Term Exam

Name:_____

Student ID:_____

March, 31

Must show all work to get full credit!

I pledge I have not violated the NJIT Honor Code_____

1. Some investigators suggest that medication adherence exceeding 85% is sufficient to classify a patient as "adherent." Suppose that in a clinical trial that each patient is classified at each center as either adherent or not based on this definition. Base on the following data, is "adherence" independent of enrollment site? Run the appropriate test at alpha = 0.05.

	Enrollment Site			
	Center 1	Center 2	Center 3	Total
Adherent (> 85%):	28	30	25	83
Not Adherent (< 85%):	21	29	17	67
Total	49	59	42	150

(15 points)

2. Suppose that a diagnostic test has been shown to 80% effective in detecting a genetic abnormality in human cells. An investigation modifies the diagnostic testing protocol and wishes to test if the new protocol has a detection rate that is significantly higher that 80% in specimens known to possess the abnormality. The new protocol is applied to 400 independent specimens of human cells known to possess the abnormality. The abnormality is detected in 333 specimens. Run the appropriate test at 1% level of significance. Compute the p-value of the test. (20 points)

3. An antismoking campaign is being evaluated prior to its implementation in high schools across the state. A pilot study involving 6 volunteers who smoke is conducted. Each volunteer reports the number of cigarettes smoked the day before enrolling in the study. Each then is subjected to the antismoking campaign, which involves educational material, support groups, formal programs designed to reduce or quit smoking, and so on. After 4 weeks, each volunteer again reports the number of cigarettes smoked the day before. Based on the following pilot data, does it appear that the program is effective? Use 1% level of significance and also compute the p-value (computing lower and upper bound for it is also fine) of the test.

At enrollment	21	15	8	6	12	22
After campaign	12	10	9	6	10	15

(25 points)

4. To investigate the true average difference in the mean number of hours that female and male students work, in addition to a full-time class load, a random sample of 20 female graduate students is selected who work a mean of 13.8 hours per week with a variance of 6.1 hours. A second random sample of 20 male graduate students is selected who work a mean of 16.4 hours per week with a variance of 4.7 hours. Construct a 90% confidence interval for the difference in true mean number of hours worked between female and male graduate students. Assume that the variances are equal.
(15 points)

5. Suppose we wish to design a study to investigate the effects of loud music on teenager's ability to concentrate. We know from previous studies that the standard deviation of time to complete this task is 3.4 minutes. How many subjects would be required to ensure with 99% confidence that the generated estimate is within 0.5 minute of the true mean time required to complete the task?
(12 points)

6. An article was published recently suggesting that persons who exercise regularly can reduce their risk of major clinical events (e.g., diabetes, cardiovascular disease) by up to 50% in some instances. It is believed that only 30% of adult Americans exercise on a regular basis, if five adult Americans are randomly chosen and analyzed, what is the probability that more than half of them exercise on a regular basis? Find the standard deviation of the number of adult Americans who exercise out of the sample of five. Is normal a good approximation of the random variable to solve this problem, why or why not?
(13 points)