Math 663-101, Fall 2008

Name:_____

Mid-Term Exam

Student ID:_____

October, 27. Must show all work to get full credit!

I pledge I have not violated the NJIT Honor Code_____

1. The following data were collected from a random sample of ten students who started the masters in public health (MPH) program in the fall of 1998. The data reflect graduate record exam (GRE) scores, which range from 200 to 800 with higher scores indicative of better achievement.
   a. Based on the data below can one conclude at alpha = 0.01 that the true mean GRE score for in coming MPH students is 560? Compute the p-value of the test (compute lower and/or upper bound for the p-value).
   b. Compute the sample median and the inter quartile range.

520	680	470	560	510	610	670	560	530	475

   (15 points)

2. The following table classifies patients in a research study of cardiovascular risk factors according to their gender and whether they have a family history of cardiovascular disease:

		History of Cardiovascular Disease (CVD)	
		No	Yes
Gender	Female	120	28
	Male	165	30

   i. Given that a female patient has been chosen at random from this research study compute the probability that the patient has cardiovascular disease.
   ii. Test the hypothesis that history of cardiovascular disease is independent of gender. Use alpha = 0.05.   (15 points)

3. Researchers claim that a new treatment for chronic bronchitis is 80% effective in reducing symptoms. If new treatment is administered to 120 randomly chosen patients suffering from bronchitis, what is the probability that at least 80 patients will show reduced symptoms? What are the assumptions of the model used? If an approximation is used to compute the probability is the approximation good? Why? (20 points)

4. Suppose an observational study is conducted to investigate the smoking behaviors of male and female patients with a history of coronary heart disease. Among 200 men surveyed, 80 were smokers. Among 190 women surveyed, 88 were smokers.
   a. Estimate the odds ratio (OR) of smoking for male versus female patients with a history of coronary heart disease.
   b. Construct a 90% confidence interval for the odds ratio.
   c. Based on a. and b., would you reject Ho: OR =1 in favor of H_1: OR $\neq$ 1? Explain. What is the significance level of your test? (20 points)

5. The health department at a major university is interested in whether there is a difference in the mean number of visits to the student health center between college freshmen and sophomores. The following data are collected on random samples of freshmen and sophomores:

Year in School	Number of Students	Mean Number of Visits to the student Health Center	Variance in Number of Visits to the Student Health Center
Freshman	21	3.4	4.4
Sophomores	31	4.5	1.8

Use the appropriate (must show work) test to determine a significant difference in the mean number of visits to the student health center between university freshmen and sophomores and throughout use alpha = 0.05.
 (20 points)

6. We wish to design a study to compare two antihypertensive medications. How many subjects would be required to detect with 90% power and alpha = 0.05 a difference of 20 units in mean systolic blood pressures between groups? The standard deviation in systolic blood pressure based on past research was taken to be 25 units in each group. Use formula sheet to determine the sample size in each group. (10 points)