STA 6934 – Fall 2003 – Quiz 2

Print Name: **UFID:**

1) Among a population of HMO patients, blood pressures are approximately normally distributed with mean 140, and standard deviation 10.

a) Policy is to give a blood pressure medication to anyone with a blood pressure exceeding 155. What fraction of the HMO patients should be given the medication?

b) The HMO administrator wants to charge an extra premium to those falling in the highest 2.5% of blood pressures. What is the cut-off value for which people will have to pay the premium if their blood pressure exceeds the cut-ff?

c) What is the probability a random sample of $n = 25$ patints will have a mean blood pressure exceeding 142?

2) For each of the following studies, which statistical test would be most appropriate?

a) A drug manufacturer wants to compare the bioavailabilities of two formulations of a drug. They recruit 18 individuals, giving half the individuals formulation A in period 1 and formulation B in period 2. The other half of the individuals receive formulation B in period 1 and formulation A in period 2. They believe that the differences in the AUC outcomes (Form A - Form B) will be approximately normally distributed.

b) A researcher wants to compare the out-of-pocket annual prescription drug expenditures between elderly males and females on fixed incomes. A sample of 15 males is obtained, as well as an independent sample of 15 females. Each individual's out-of-pocket expenditures is measured. The researcher is certain that the distributions will be non-normal due to a few very extreme individuals.

3) For each of the following statements, give the best response: **True** of **False**.

a) Clinical trials used to demonstrate efficacy of a treatment are usually based on large samples to increase the probability of a Type II error. _____

b) The authors of a study comparing radiation levels in kids who grew up near nuclear reactors and kids growing up in other areas, report a P-value of 0.30 for testing whether population mean radiation levels differ between the 2 groups (H_0 : Means are same for two groups). We cannot conclude that the means differ, based on a test with $\alpha = 0.05$ significance level. _____

c) A study has concluded that a new training method for nurses produces higher mean scores on a proficiency exam than the old training method, based on an $\alpha = 0.05$ significance level test. In truth, the mean scores for the two methods are the same. The study resulted in a Type II error. _____

4) A clinical trial was conducted to compare hair growth among men receiving minoxodil and a parallel group of men receiving placebo. The number of new hair follicles growing in the target zone was measured for each man after a 12-week treatment period. Summary info are given below:

	Tx Group	
	Rogaine (i=1)	Placebo (i=2)
n_i	15	15
$\overline{Y}_i$	14.0	8.0
S_i	6	8

We wish to use the 2-sample t-test whether the true mean number of hair follicles differ between the rogaine and placebo groups.

a) What are the null and alternative hypotheses?

i) $H_0 : \mu_1 - \mu_2 = 0 \qquad H_A : \mu_1 - \mu_2 > 0$

ii) $H_0 : \mu_1 - \mu_2 \neq 0 \qquad H_A : \mu_1 - \mu_2 = 0$
iii) $H_0 : \overline{Y}_1 - \overline{Y}_2 = 0 \qquad \overline{Y}_1 - \overline{Y}_2 \neq 0$
iv) $H_0 : \mu_1 - \mu_2 = 0 \qquad H_A : \mu_1 - \mu_2 \neq 0$
v) $H_0 : \overline{Y}_1 - \overline{Y}_2 = 0 \qquad \overline{Y}_1 - \overline{Y}_2 > 0$
vi) $H_0 : \overline{Y}_1 - \overline{Y}_2 \neq 0 \qquad \overline{Y}_1 - \overline{Y}_2 = 0$

b) Given that $S_p^2 = 50.0$ and that $\sqrt{S_p^2(\frac{1}{n_1} + \frac{1}{n_2})} = 2.58$, give the test statistic.

c) Clearly state the rejection region for your test in part a) with $\alpha = 0.05$ significance level.

d) What is your conclusion?

5) The manufacturer of an age defying new drug wishes to compare the number of unsightly blotches for their new drug, as compared to a placebo. A sample of six adult males are selected, and each is given each treatment in a crossover design (with a long washout period between treatments). The data are given below (Y is the number of unslightly blotches):

Subject	New Drug	Placebo	Diff
John	12	4	8
Jim	2	3	
Jack	10	7	
Jerry	5	1	
Joe	11	4	
Jarvis	7	5	

Use the Wilcoxon Signed-Rank test to determine whether we can conclude that the new drug causes more blotches on average than the placebo at the $\alpha = 0.05$ significance level.

a) Complete the table, and give the test statistic.

b) We conclude in favor of the alternative hypothesis if the test statistic is less than or equal to $T_0 = 2$. What is your conclusion?