Math/STAT 319 Homework 8 Due Mar. 22 (one page)

1. Ex 9.44 Scientists have recently become concerned about the safety of Teflon cookware and various food containers because perfluorooctanoic acid(PFOA) is used in the manufacturing process. An article in the July 27, 2005, New York Times reported that of 600 children tested, 96% of them had PFOA in their blood. According to the FDA, 90% of all Americans have PFOA in their blood.

   (a) Does the data on PFOA incidence among children suggest that the percentage of all children who have PFOA in their blood exceeds the FDA percentage of all Americans? Carry out the appropriate test of hypothesis.

   (b) In 95% of all children have PFOA in their blood, how likely is it that the null hypothesis tested in (a) will be rejected when a significance level of 0.01 is employed?

2. Ex 9.54 Many consumers are turning to genetics as a way of reducing the cost of prescription medications. The article "Commercial Information on Drugs: Confusing to the Physician?" gives the results of a survey of 102 doctors. Only 47 of those surveyed knew the generic name for the drug methadone. Does this provide strong evidence for concluding that fewer than half of all physicians know the generic name for methadone? Carry out a test of hypotheses with a significance level of 0.01 using the P-value method.

3. Ex 10.5 Persons having raynaud's syndrome are apt to suffer a sudden impairment of blood circulation in fingers and toes. In an experiment to study the extent of this impairment, each subject subject immersed a forefinger in water and the resulting heat output (cal/cm2/min) was measured. For $m = 10$ subjects with the syndrome, the average heat output was $\bar{x} = 0.64$, and for $n = 10$ nonsufferers, the average output was 2.05. Let μ_1 and μ_2 denote the true average heat outputs for the two types of subjects. Assume that the two distributions of heat output are normal with $\sigma_1 = 0.2$ and $\sigma_2 = 0.4$.

   (a) Consider testing $H_0 : \mu_1 - \mu_2 = -1$ versus $H_1 : \mu_1 - \mu_2 < -1$ at the level 0.01. Carry out the appropriate test.

   (b) Compute the P-value for the value of Z obtained in part(a). (Extra credits 10pt)

   (c) What is the probability of a type II error when the actual difference between μ_1 and μ_2 is $\mu_1 - \mu_2 = -1.2$?