KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS

STAT 302 Exam #3

Name: _____ ID# _____

STATE ALL ASSUMPTIONS AND GIVE REASONS

1) The output voltage for an electric circuit is specified to be 130. A sample of 40 independent readings on the voltage for this circuit gave a mean of 128.6 and a standard deviation of 2.1.
   a) At the 5% significance level, is there evidence that the average output is less than 130?

   b) What is the power of the test if the true mean voltage is 129? Explain what that means.

2) Let $Y_1, \cdots, Y_n$ be a random sample from the Bernoulli desnsity

3) $f_Y(y|p) = p^y(1-p)^{1-y}, \qquad y = 0,1$

Assume that the prior distribution of p is Uniform on *(0,1)*.

a) Find the marginal distribution of $Y_1, \cdots, Y_n$

b) Find the posterior distribution of $p|Y_1, \cdots, Y_n$.

c) Find the Bayes' estimate of p.

3) Let $Y_1, \cdots, Y_n$ is a random sample from the Bernoulli density

$$f_Y(y|p) = p^y(1-p)^{1-y}, \qquad y = 0,1$$

Find the most powerful test of the hypothesis

$$H_0: p = p_0 \quad vs \quad H_a: p = p_1, \quad \text{where } p_0 < p_1$$

Express the rejection region in terms of the simplest possible statistic.

4) If $Y_1, \cdots, Y_n$ is a random sample from a normal population with mean μ and known variance σ^2. Find the critical region of the likelihood ratio test for testing

5) $H_0: \mu = \mu_0 \quad vs \quad H_a: \mu \neq \mu_0$