

KABARAK



UNIVERSITY

EXAMINATIONS

2008/2009 ACADEMIC YEAR

**FOR THE DEGREE OF BACHELOR OF EDUCATION
SCIENCE**

COURSE CODE: MATH 415

COURSE TITLE: TEST OF HYPOTHESIS

STREAM: SESSION VII

DAY: THURSDAY

TIME: 2.00 - 4.00 P.M.

DATE: 27/11/2008

INSTRUCTIONS:

Answer question **ONE** and any other **TWO**

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

- a) Differentiate between power of a test and size of a test (2marks).
- b) Discuss the application Students t-distribution and Normal distribution (4marks)
- c) From the information given as $\bar{x}=16.32$ $s=0.8$ $n=30$. Test the following hypothesis at a level of significance 5% and obtain the p-value (5marks).

$$H_0 = 16$$

$$H_1 \neq 16$$

- d) What do you understand by level of confidence and level of significance (2marks).
- e) A certain company is interested in certain safety features and must know whether or not the standard deviation of the time it takes drivers to react in an emergency situation is less than 0.010 seconds. Use 0.05 level of significance to test the null hypothesis $\sigma = 0.010$ against the alternative hypothesis $\sigma < 0.010$ on the basis of a random sample of size $n=15$ for which $s=0.006$ seconds (6marks).

f) Differentiate between Type I and Type II errors (3marks)

g) What do you understand by p-value (2marks?)

h) Differentiate between simple and composite hypotheses (3marks)

i) What do understand by most powerful test and uniformly most powerful test (3marks).

QUESTION TWO (20MARKS)

- a) Define Likelihood Ratio test and describe when it is being used, also state the likelihood ratio statistic (5marks).
- b) Find the critical region of the likelihood ratio test for testing the null hypothesis

$$H_0 : \mu = \mu_0$$

$$H_1 : \mu \neq \mu_0$$

on the basis of a random sample of size n from a normal population with the known variance σ^2 (15marks)

QUESTION THREE (20MARKS)

- a) Random samples below shows average heights of adult females born in two different countries;

$$n_1 = 120 \quad \bar{x}_1 = 62.7 \quad s_1 = 2.50$$

$$n_2 = 150 \quad \bar{x}_2 = 61.8 \quad s_2 = 2.62$$

Use 0.05 level of significance to test the null hypothesis that the corresponding population means are equal against the alternative hypothesis that they are not equal (10marks).

- b) Use the Neyman-Pearson lemma to find the most powerful critical region of size α .

A random sample of size n from a normal population with $\sigma^2 = 1$ is to be used to estimate the null hypothesis $\mu = \mu_0$ against the alternative $\mu = \mu_1$, where $\mu_1 > \mu_0$. (10marks)

QUESTION FOUR (20 MARKS)

- a) A referral Hospital knows from past experience that the weight of patients is normally distributed with a mean μ of 80kgs and a standard deviation σ of 10 kgs. A hospital wants to test at 1% level of significance if the average weight of this year's patients is above 80 kgs. To do this it takes a random sample of 25 patients and finds that the average weight for this sample is 85kgs. Test the hypothesis (4marks).
- b) Find the probability of accepting H_0 for (a) if (i) $\mu = \mu_0 = 80kgs$ (ii) $\mu = 82kgs$ (iii) $\mu = 84kgs$ (iii) $\mu = 85kgs$ (iv) $\mu = 87kgs$ (v) $\mu = 90kgs$ (10marks)
- c) Draw the Operating Characteristic (OC) curve (3marks)
- d) Draw a Power Curve (3marks)

QUESTION FIVE (20MARKS)

- a) A certain company wants to determine at the 1% level of significance if the proportion of acceptable electronic components of a foreign supplier p_1 is greater than for a domestic supplier p_2 . The firm takes a random sample from a shipment of each supplier and finds that $\bar{p}_1 = 0.9$ and $\bar{p}_2 = 0.7$ for $n_1 = 100$ and $n_2 = 80$.

Test the hypothesis

$$H_0 : p_1 = p_2 \quad (10\text{marks})$$

$$H_1 : p_1 > p_2$$

- b) The specifications for a certain kind of ribbon call for a mean breaking strength of 185kgs. If five pieces randomly selected from different rolls have breaking strengths of 171.6, 191.8, 178.3, 184.9 and 189.1kgs, test the null hypothesis $\mu = 185\text{kgs}$ against the alternative hypothesis $\mu < 185$ at the 0.05 level of significance (10marks).