CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF EDUCATION AND BACHELOR OF EDUCATION

MATH 452: TEST OF HYPOTHESIS

STREAMS: ESC, BED, BA   **TIME: 2 HOURS**

DAY/DATE: MONDAY 17/12/2018   **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS: Answer question ONE (Compulsory) and any other TWO questions

QUESTION ONE (30 MARKS)

(a) Explain the following terms as used in statistical hypothesis

   (i)   Type I and Type II error   [2 marks]

   (ii) Null and Alternative hypothesis   [2 marks]

   (iii) Simple and composite hypothesis   [2 marks]

(b) A manufacturer of a certain electronic tube claims that the average life span of tubes will exceed 1000 hours from the past experience the standard deviation is known to be 120 hours. A retailer is willing to order for a large consignment at the manufacturer claim is true. The retailer sets a sample of 36 tubes tested and finds that the sample mean lifespan is 1040 hours. Should the retailer order for the consignment? Assume the sample is taken from a normal distribution and alpha = 5% significance level   [6 marks]

(c) Suppose a researcher would like to test the hypothesis $H_o : \theta = 0.9 \, Vs \, H : \theta = 0.6$ lets his test of hypothesis be X, the number of successes in 20 trials. He will accept the null hypothesis if $X \geq , 15$ or otherwise conclude that $\theta = 0.6.$ obtained the significance level of the test and probability of type II error   [6 marks]

(d)   The rate of service of a component is a normally distributed with mean of 145 hours and

$\sigma^2 = 100$ hours. If it has been manufactured correctly a defect in the

manufacturer result   is shorter life time for the component from a large lot which side all good

and all defective one. 10 items are chosen, tested and formed to have an average life time of 132

hours. Should the lot be accepted if we require the probability of rejecting a good lot to

be less than 0.02? If the lot has a mean of 130 hours, what would be the probability of

accepting it?   [7 marks]

(e)   A random sample of 19 babies of a certain age was taken from a normal population and it

was found that the standard deviation of their weights is 2.5 kg. Test the hypothesis that

$H_o : \sigma = 3 \, Vs \, H : \sigma \neq 3$ at $\propto$ SL.   [5

marks]

QUESTION TWO (20 MARKS)

(a)   Outline the steps involved in testing of hypothesis   [10 marks]

(b)   A botamist is interested in comparing the growth response of dwarf P stems to two

different levels of the hormone in the indoleacetric acid. Let X denotes the growth

attitude to level 1 and Y be the growth attributed to level 2. … observation on X were

made and 13 observations were made on Y. the observation were as follows:

X	0.8	1.8	1.0	0.1	0.9	1.7	1.0	1.4	0.9	1.2	0.5
Y	1.0	0.8	1.6	2.6	1.3	1.1	2.4	1.8	2.5	104	1.9

Assuming that the two samples are random samples from normal population where

$X \, N(o, \sigma^2)$ & $Y_n N(o, \sigma^2)$. Test the hypothesis that $H_o : \mu_1 = \mu_2$ $v_s H_1 : \mu_1 \neq \mu_2$

at 5%   level of significance   [10 marks]

QUESTION THREE (20 MARKS)

(a)   In statistic examination for the university students, the 22 females used in the study has a

mean score of 18 and variance of 12. While the 20 marks used has 9 mean score of 78

and a variance of 10. Do you think gender, have an effect on the score of these university

student at $\alpha=5$ [6 marks]

(b) The mean of 25 samples selected from a population of mean μ and variance is 100

and 52 respectively. Test the hypothesis $H_o:\mu=49\,Vs\,H:\mu>49$ at $\alpha=5$ [4 marks]

(c) In an investigation to find out the effect of a diet on a patients weight, 10 patient were
     weighed before and after the administration of the drugs. The obtained results are as
     follows

After	68	72	71	75	64	74	62	75	82	76
Before	71	64	70	75	67	60	57	69	84	72

Test hypothesis that the mean difference of mean is zero at 95% confidence level

[10 marks]

QUESTION FOUR (20 MARKS)

(a) Alfafa (kind of plant grown as fodder for animal) yields of 6 test plots are 1.5, 1.9, 1.2,

1.4, 2.3, 1.3 tonnes respectively per hectare. Use a critical region of $\alpha=5$ to test the

hypothesis $H_o:\mu=1.8\,V_5\,H_i=\mu\neq1.8$. Assume that the yields have a normal

distribution [5 marks]

(b) Suppose $X\ N(0.\sigma^2)$ and $X_1,X_2...,X_n$ is a random sample from this population.

Obtain a must powerful size α test for testing $H_o:\sigma=2\,V_5\,H_i:\sigma=4\,at\,\alpha=1$ [15 marks]

QUESTION FIVE (20 MARKS)

(a) Let X be the 1Q scores for a certain population and that $X\ (\mu,1)$. To test

$H_o:\mu=35$ Vs $H_1:\mu=35$ a random sample of size $n=12$ from this population was

taken. If a mean of $\acute{x}=33.6$ with a standard deviation of 2.3 was observed, do we accept or

reject the null hypothesis at $\propto=5$

[9 marks]

(b)   In comparing the length of the tensile strength of two kinds of structural steel, an experiment yielded the following results: M=13, n=16. The sample variance of the first sample was 19.2 and for the second sample was 3.5. Assuming the measurements constitute an independent sample from normal population. Using $\propto=5$. Test the null

hypothesis that $H_o:\sigma_1^2=\sigma_2^2$ Vs $H_1:\sigma_1^2\neq H_o:\sigma_2^2$ [5 marks]

(c)   Let X be normal random variable with mean μ and variance 4. For the following

hypothesis test. $H_o:\mu=1\,Vs\,H_1:\mu=2$. Suppose we reject H_o when $X\geq3$.

Calculate
        (i)   P (type I error)   [3 marks]
        (ii)   P (type II error)   [3 marks]