CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF SCIENCE IN WILDLIFE ENTERPRISE AND MANAGEMENT

WIEM 347: WILDLIFE STATISTICS

STREAMS: BSC (WIEM)   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 14/04/2020   **8.30 AM – 10.30 AM**

INSTRUCTIONS:

Attempt Question One and any other Two

Question One (30 Marks)

(a)   Discuss the role of statistics in the wild life conservation and management. Use relevant examples/illustrations to make your points clear.   [8 marks]

(b)   State and describe the two types of errors that you would probably commit in an hypothesis testing problem. Suggest on how you could minimize each one of them.
[5 marks]

(c)   Explain the steps involved in solving an hypothesis testing problem.   [5 marks]

(d)   Explain the difference between a one-tailed and a two-tailed test.   [3 marks]

(e)   The average depth of the Ndagani Bay is 305 feet. Climatologists were interested in seeing if deforestation was affecting the water level. Fifty-five measurements over a period of randomly selected weeks yielded a sample mean of 306.2 feet. The population variance is known to be 3.6. Can it be concluded at the 0.05 level of significance that the average depth has increased? Is there evidence of what caused this to happen?   [5 marks]

Question Two (20 Marks)

(a)   Discuss the steps in the stratified sampling procedure.   [5 marks]

(b)   Ten years ago, the average acreage of farms in a certain geographic region was 65 acres. The standard deviation of the population was 7 acres. A recent study consisting of 22

randomly selected farms showed that the average was 63.2 acres per farm. Test the claim, at $\alpha = 0.10$, that the average has not changed by finding the P-value for the test. Assume that σ has not changed and the variable is normally distributed. [5 marks]

(c) At an agricultural station, it was desired to test the effect of a given fertilizer on wheat production. To accomplish this, 24 plots of land having equal areas were chosen; half of these were treated with the fertilizer and other half were untreated (control). Otherwise the conditions were the same. The mean yield of wheat on the untreated plots was 4.8 kg with a standard deviation f 4 kg, while the mean of the treated plots was 5.1 kg with a standard deviation of 3.6kg. at a significant level of (a) 1% and (b) 5% test whether there is a significant improvement in the wheat production because of the fertilizer. [10 marks]

Question 3 (20 Marks)

(a) A study using two random samples of 35 people each found that the average amount of time those in the age group of $26 - 35$ years spent per week on leisure activities was 39.6 hours, and those in the age group of $46 - 55$ years spent 35.4 hours. Assume that the population standard deviation for those in the first age group found by previous studies is 6.3 hours, and the population standard deviation of those in the second group found by previous studies was 5.8 hours. At $\alpha = 0.05$, can it be concluded that there is a significant difference in the average times each group spends on leisure activities? [5 marks]

(b) The weight and systolic blood pressure for 10 randomly selected male lions in a certain nation game reserve are shown in the table below:

Weight	165	167	180	155	212	175	190	210	200	149
Systolic BP	136	133	150	128	151	146	150	148	148	125

(i) Fit a simple linear regression model of weight on systolic B.P $y = \beta_0 + \beta_1 x + e$ where β_0, β_1 are model parameters, y-weight and x-Systolic BP. [10 marks]

(ii) Test the hypothesis $H_0: \beta_1 = 0$ at $\alpha = 1\%$ level of significance. [5 marks]

Question 4 (20 Marks)

(a) Discuss two probabilistic sampling methods and two non-probabilistic methods. In your discussion, highlight the procedures involved, advantages and disadvantages of each of the method. [10 marks]

(b) A researcher wishes to see if there is a relationship between the parks and the number of certain types of wild animals found in those parks. A random sample of 3 parks was selected, and the number of animals for a specific year has been reported. The data shown next.

Park/Type of Animal	Animal A	Animal B	Animal C
Park 1	41	27	51
Park 2	36	03	40
Park 3	169	106	109

At $\alpha = 0.05$, can it be concluded that the number of animals is related to the type of the park? [10 marks]

Question 5 (20 Marks)

A researcher was interested in the effects of hints on anagram solution. The time it took a participant to solve five eight-letter anagrams was measured. The same five anagrams were used in three conditions: First Letter (where the first letter of the word was given), Last Letter (where the last letter was given) and No Letter (where no help was given). Thirty participants were chosen and ten were randomly allocated to each condition. The number of minutes it took to solve the five anagrams was recorded. These results are shown below.

	First letter Condition 1 $X1$	Last Letter Condition 2 $X2$	No Letter Condition 3 $X3$
	15	21	28
	20	25	30
	14	29	32
	13	18	28
	18	26	26
	16	22	30
	13	26	25
	12	24	36
	18	28	20
	11	21	25
Mean Total	15	24	28
Squared total	150	240	280
	22500	57600	78400

(a) Is there an effect of type of hint (the independent variable) on solution times (the dependent variable)? (Hint: Carry out the analysis of variance for the above data). [10 marks]

(b) Carry out the Tukey HSD (honestly significant difference) test and make an appropriate conclusion. [10 marks]