

BOWEN UNIVERSITY IWO, OSUN STATE
COLLEGE OF AGRICULTURE, ENGINEERING AND SCIENCE
STATISTICS PROGRAMME
B.Sc. DEGREE 2022/2023 SECOND SEMESTER EXAMINATION

COURSE CODE: STA 220 **COURSE TITLE:** Statistical Inference II
DATE: 17/06/2023 **TIME ALLOWED:** 3 Hours **CREDITS:** 3
INSTRUCTION: Answer questions ONE and ANY OTHER THREE

Question 1

- a. Define the following: i. Statistical Inference ii. Efficient Estimator iii. Consistent Estimator (6 marks)
- b. What do you understand by Point and Interval Estimation? (4 marks)
- c. List four properties of a sufficient estimator. (4 marks)
- d. The Means of two single large samples of 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5 inches at 5% level of significance? (11 marks)

Question 2

- a. A random sample of students of Bowen University was selected and asked their opinion about autonomous colleges. The results are given below. The same number of each sex was included within each class group. Test the hypothesis at 5% level that opinions are independent of the class groupings (12 marks)

Class	Numbers		Total
	Favoring autonomous colleges	Opposed to autonomous colleges	
1	120	80	200
2	130	70	200
3	70	30	100
4	80	20	100
Total	400	200	600

- b. Mention and explain the two types of hypothesis with examples. (3marks)

Question 3.

a. A time study engineer developed a new sequence of operation elements that he hopes will reduce the mean cycle time of certain production process. The results of a time study of 20 cycles are given below:

12.25 11.97 12.15 12.08 12.31 12.28 11.94 11.89 12.16 12.04 12.09 12.15
12.14 12.47 11.98 12.04 12.11 12.25 12.15 12.34.

If the present mean cycle time is 12.5 minutes, should he adopt the new sequence at 0.05 level of significance? (10 marks)

b. Mention the two types of hypothesis and define a degree of freedom (2 marks)

c. Write the possible combinations of size 3(without replacement) that can be gotten from the following set of data:

3, 5, 6, 7, 9, 12 (1 mark)

d. What is an unbiased estimator? (2 marks)

Question 4

a. Define the following: i. critical region ii. Composite hypothesis. (5 marks)

b. A random sample of 500 pineapples were taken from a large consignment and 65 of them were found to be bad. Show that the standard error of the proportion of bad ones in a sample of this size is 0.015 and deduce that the percentage of bad pineapples in the consignment almost certainly lies between 8.5 and 17.5. (10 marks)

Question 5

a. Show the table of errors in testing of hypothesis and explain the two types of errors. (5marks)

b. An ambulance service claims that it takes on the average 8.9 minutess to reach its destination in emergency calls. To check on this claim, the agency which licenses ambulance services has them timed on 50 emergency calls, getting a mean of 9.3 minutes and a standard deviation of 1.6 minutes What can they conclude at the level of significance 5%? (10 marks)

Question 6

- a. Write the steps involved in test of hypothesis. (5 marks)
- b. Twenty people were attacked by Ebola disease and only 18 survived. Will you reject the hypothesis that the survival rate, if attacked by this disease is 85% in favour of the hypothesis that it is more? Take $\alpha = 0.05$. (10 marks)