



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN BIOLOGY

SZL 208: COMPUTER APPLICATIONS

DATE: 29/4/2019

TIME: 2:00 – 4:00 PM

INSTRUCTION:

Answer Question **ONE** which is compulsory and any other **TWO** Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Discuss four advantages of using computer in research (8 marks)
- b) Two different types of drugs A and B were tried on certain patients for increasing weight, 5 persons were given drug A and 7 persons were given drug B. The increase in weight (in Kgs) is given below:

Drug A	8	12	13	9	3	-	-
Drug B	10	8	12	15	6	8	11

By using a computer or otherwise determine whether the two drugs differ significantly with regard to their effect in increasing weight at $\alpha = 5\%$ (7 marks)

- c) Distinguish the following terms as used in scientific research
- i) Probability sampling and non-probability sampling
 - ii) Sampling errors and non-sampling errors (4 marks)
- d) Discuss three sources of data for scientific research (6 marks)
- e) Define data integrity and highlight three ways through which it can be compromised (5 marks)

QUESTION TWO (20 MARKS)

- a) Define the term scientific research and justify why it is an ongoing process (6 marks)
- b) The data below is a summary of copy typing speed per minute before and after training.

Participant	A	B	C	D	E	F	G	H
Rate Before	85	124	172	123	111	139	99	77
Rate after	105	160	175	143	156	127	95	100

By using a computer or otherwise test the hypothesis that on average the training did not result to any improvement on the typing speed. (8 marks)

- c) Highlight the main areas to cover for any publication work (6 marks)

QUESTION THREE (20 MARKS)

- a) Highlight the basic steps for carrying out a scientific research (6 marks)
- b) The lecturer presumed that the average class attendance was 65 students. He did call register for 10 days and observed following: 66, 65, 69, 70, 69, 71, 70, 63, 64 and 68. The t-test output was as given

The sample t-test output, for the test value=65						
	t	df	Sig. (2- tailed)	Mean difference	95% CI of the difference	
					Lower	Upper
Attendance	2.825	9	0.020	2.500	0.4979	4.5021

- i. State the hypothesis for the above scenario
- ii. Based on the t-value and the sig.(2-tailed) value make statistical conclusion
- iii. Interpret the 95% CI lower and upper difference values (6 marks)
- c) Discuss any four types of test-statistics and highlight when appropriate to use each (8 marks)

QUESTION FOUR (20 MARKS)

- a) Differentiate the following terms as they apply in scientific research
- i) Sample and Population
- ii) Response and independent variables
- iii) Descriptive and inferential statistics
- iv) Null hypothesis and Alternative hypothesis (8 marks)

- b) The data below give the scores for males and females performance of certain task

Gender	Performance											
Female	11	34	56	78	32	16	76	44	23	45	32	
Male	45	66	54	32	31	58	76	39	65	-	-	

Using the data determine the

- Mean performance for each gender
- The quartiles for each gender
- Represent the information in a boxplot (per gender)
- Using the boxplot state which gender was more dispersed. (12 marks)

QUESTION FIVE (20 MARKS)

- a) Distinguish the following terms as they apply
- Computer system and computer software
 - Spreadsheet and database (4 marks)
- b) Discuss five ways of dealing with a missing data at analysis stage (10 marks)
- c) The following data represents the heights of ten randomly sampled students from a BSc biology class 2.3, 2.5, 2.5, 2.7, 2.8 3.2, 3.6, 3.6, 4.5, 5.0

Represent the data in the stem-and-leaf plot (6 marks)

A cohort study of smoking and bladder cancer was conducted in a small island population. There were a total of 1000 people on the island where 400 were smokers while 600 were not. Fifty of the smokers and ten of the non-smokers developed bladder cancer. Using this information;

- Construct a two by two table and label the cells and margins.
- Determine
 - Absolute Risk (Actual)
 - Relative Risk (risk ratio)
 - Attributable Risk
 - Odds Ratio (8 marks)

- d) The function $\hat{y} = 3.5 + 1.23x_1 + 0.78x_2$ is model of predicting the expected yield (kg '000') per hectare of a certain crop as influenced by fertilizer $k63(x_1)$ and the humidity level (x_2) . Interpret the values 3.5, 1.23 and 0.78 (6 marks)
- e) Differentiate the following terms as apply in social research.
- i) Type I and Type II error
 - ii) Sample and population
 - iii) Two tailed and one tailed test (6 marks)