

UNIVERSITY OF SWAZILAND  
MAIN EXAMINATION PAPER 2015/2016

**TITLE OF PAPER:** BIostatISTICS

**COURSE CODE:** B305

**TIME ALLOWED:** THREE (3) HOURS

- INSTRUCTIONS:**
1. ANSWER ANY FOUR QUESTIONS.
  2. EACH QUESTION CARRIES TWENTY FIVE (25) MARKS.
  3. ILLUSTRATE YOUR ANSWERS WITH LARGE AND CLEARLY LABELED DIAGRAMS WHERE APPROPRIATE.
  4. CLEARLY STATE YOUR NULL AND ALTERNATIVE HYPOTHESES AND YOUR CONCLUSIONS WHERE APPROPRIATE.

**SPECIAL REQUIREMENTS:**

1. CALCULATORS (CANDIDATES MUST BRING THEIR OWN).
2. GRAPH PAPER.
3. STATISTICAL TABLES (TO BE SUPPLIED BY THE LECTURER).

**THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN  
GRANTED BY THE INVIGILATORS**

**COURSE CODE B305 (M) 2015/2016**

**ANSWER FOUR (4) OUT OF SIX (6) QUESTIONS**

**QUESTION 1**

The following data were collected by a psychologist:

Test score (%)	Time studied (min)
88	120
80	105
76	106
83	108
55	98
62	97
67	99

- a) Is there a significant correlation between the amount of time a student studied and his/her test score? [15 marks]
- b) Present these data in an appropriate graph [10 marks]
- [TOTAL = 25 marks]

**QUESTION 2**

The following table shows the number of items of litter (trash) washing up onto three different beaches. The data are not normally distributed.

Sampling occasion	Beach 1	Beach 2	Beach 3
1 <sup>st</sup>	68	67	61
2 <sup>nd</sup>	69	69	65
3 <sup>rd</sup>	71	72	67
4 <sup>th</sup>	71	70	65
5 <sup>th</sup>	68	69	63

- a) Using an appropriate statistical test, establish whether the three different beaches have significantly different litter.
- b) Present these data in an appropriate graph showing the mean and standard deviation of litter on the three beaches. [25 marks]

**QUESTION 3**

- a) Discuss what constitutes a good research question. How does one go about developing a good research question? [10 marks]
- b) Explain the five basic steps that need to be followed to achieve a properly designed experiment. [15 marks]

**[TOTAL = 25 marks]**

**QUESTION 4**

Discuss in detail the various components of a good proposal.

**[TOTAL = 25 marks]**

**QUESTION 5**

- a) Consider the following experiment. Ten animals belonging to the mammalian species *Cricetomys ansorgei* have been trained over several months to detect landmines buried under the soil using scent. Their efficacy at detecting landmines is then put to the test by presenting them with a real landmine and a plastic copy. Of the 10 individuals, nine are observed to point at the real landmine and one at the plastic. Are these animals statistically significantly able to detect landmines? Use an appropriate test to do this (note that the assumptions of the chi-square test are violated). [20 marks]
- b) What are the assumptions of parametric tests? [5 marks]

**[TOTAL = 25 marks]**

**QUESTION 6**

You prepare your data in an Excel file called: Fruit\_mass\_2015.csv

You then use the following code to call up these data into R:

```
Fruit.mass = read.table ("Fruit_mass_2015.csv", header = TRUE, sep = ",")
```

- a) What do you type to see what is in this object that you've just created? (Write exactly what you will type into R; nothing more or less). [3 marks]
- b) What does the code "class(Fruit.mass)" do? [3 marks]
- c) Does your original .csv file have column headers? [3 marks]

- d) Closely examine the following R code (below). What have you produced by this code? Explain.

```
Grade_A = c(3)
Grade_B = c(15)
Grade_C = c(28)
Grade_D = c(18)
Grade_E = c(1)
class_2014 = rbind(Grade_A, Grade_B, Grade_C, Grade_D, Grade_E)
```

- e) Refer to the data presented in (d) above. What would you see if you typed "class\_2014" (without the inverted commas"). Make sure to show exactly what this is (do not give a description of it). [4 marks]
- [6 marks]
- f) List the four types of **objects** that are used in the program "R", and explain how they differ from one another. [6 marks]

**[TOTAL = 25 marks]**