

UNIVERSITY OF SWAZILAND
MAIN EXAMINATION PAPER 2013/2014

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

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

QUESTION 1

The following data were collected by an ecologist:

Tree height (m)	Soil depth (mm)
150	120
670	230
1020	502
313	192
518	243
401	221
826	315

- a) Is there a significant correlation between tree height and soil depth? [15 marks]
 b) Present these data in an appropriate graph [10 marks]

[TOTAL = 25 marks]

QUESTION 2

- a) Provide a precise definition of a normal distribution [5 marks]
 b) Present the following data in a graph that shows the mean, 95% confidence intervals, range and number of observations for each species. [15 marks]

Species	n	Width (micron)	SE	Range
"A"	23	32.2	2.60	25.0-39.0
"B"	29	38.4	1.77	31.0-43.5
"C"	19	39.9	1.63	32.3-44.1

- c) What are the assumptions of parametric tests? [5 marks]

[TOTAL = 25 marks]

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

QUESTION 3

a) A biodiversity survey resulted in the following data (below). The table shows the number of turtles seen on the beach, counted on four different transects.

Habitat	Morning	Afternoon
Transect 1	53	45
Transect 2	47	45
Transect 3	58	48
Transect 4	49	43

a) Does time of day affect the number of turtles on the beach? Use an appropriate statistical test to test this.

[15 marks]

a) Explain in detail the procedure of stratified random sampling. Include in your discussion why this procedure is necessary, and include an example of how you would conduct this.

[10 marks]

[TOTAL = 25 marks]

QUESTION 4

The following table shows the pH of three streams. The data are normally distributed.

Stream 1	Stream 2	Stream 3
6.8	6.7	6.1
6.9	6.9	6.5
7.1	7.2	6.7
7.1	7.0	6.5
6.8	6.9	6.3

Using an appropriate statistical test, establish whether the three different streams have significantly different pH. If appropriate, use the Tukey test to identify where the difference lies.

[25 marks]

QUESTION 5

- a) Explain the five basic steps that need to be followed to achieve a properly designed experiment. [15 marks]
- b) What is the difference between a histogram and an X-Y graph? Draw sketches of each type (not on graph paper) to illustrate your answer. [10 marks]

[TOTAL = 25 marks]

QUESTION 6

a) The data given in the table below are not parametric. Why not?

[2 marks]

	Mass (g)	
	Pop. A	Pop. B
	12.2	6.6
	12.5	6.9
	11.8	6.1
	12.7	6.7
	13.0	6.8
Mean	12.44	6.62
Variance	0.213	0.097

c) Using an appropriate transformation, transform these data.

[6 marks]

d) Are the transformed data now parametric? If so, why?

[2 marks]

e) Using an appropriate test, test whether the masses of the two populations are the same.

[15 marks]

[TOTAL = 25 marks]