

UNIVERSITY OF ESWATINI
DEPARTMENT OF GEOGRAPHY, ENVIRONMENTAL SCIENCE AND
PLANNING

MAIN EXAMINATION-DECEMBER 2019

B.A., BASS, B.Ed. & B.Sc.

TITLE OF PAPER: RESEARCH METHODS

COURSE CODE: GEP313

TIME ALLOWED: THREE (3) HOURS

- INSTRUCTIONS:
1. ANSWER THREE (3) QUESTIONS
 2. QUESTION 1 IS COMPULSORY
 3. ANSWER ANY TWO QUESTIONS FROM SECTION B
 4. WHERE APPROPRIATE, ILLUSTRATE YOUR ANSWER WITH DIAGRAMS AND EXAMPLES

MARKS ALLOCATION: QUESTION ONE (1) CARRIES 40 MARKS. THE REST OF THE QUESTIONS CARRY 30 MARKS EACH.

THIS QUESTION PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR

GEP313: RESEARCH METHODS – DECEMBER 2019

SECTION A: COMPULSORY

QUESTION 1

a) Describe the following variables as either categorical (binary, nominal, ordinal) or numeric (discrete, continuous). Think whether the variable values will be obtained by measurement or by counting.

- i) Soil type
- ii) Measurements of height of trees
- iii) Weight of soil samples
- iv) Moisture in maize stems
- v) Favorite Toothpaste
- vi) Frequency of church attendance
- vii) Number of deaths in one year
- viii) Place of birth
- ix) Body temperature
- x) Educational status
- xi) Number of meals per day
- xii) Farmers' perceptions on climate change

(24 marks)

b) A study was carried out to determine Geography pass rate among students from 16 different geographical areas, over a fixed period of time. Other variables recorded were the age, gender, date of attendance, mode of transport and distance traveled for all students attending the Geography class over a period of one month. Which one is the outcome or dependent variable?

(2 marks)

c) The following is an output from stata statistical analysis software:

Source	SS	df	MS
Model	7368.10	1	7368.10
Residual	798.58	28	28.52
Total	8166.67	29	281.61

Moisture	Coef.	Std. Err.	t	P> t
Tree age	0.809	0.050	16.07	0.000
_cons	19.246	6.631	2.90	0.007

- Calculate R-Squared and state what the calculated value means. (3 marks)
 - Construct the regression equation that describes the above output. (3 marks)
 - Assuming a t-distribution of 2.048, calculate a 95% confidence interval for the above output. (4 marks)
- d) Draw a histogram with intervals of length 5 cm presenting the distribution of the data Table 1 below. (4 marks)

Table 1

Class (cm)	Freq	Rel. freq (%)
0-4	32	49.2
5-9	14	21.5
10-14	9	13.9
15-19	4	6.2
20-24	1	1.5
25-29	2	3.1
30-34	3	4.6

Class/Category (cm)

(40 Marks)

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION 2

- a) What is sampling and why is it often necessary to sample? (4 marks)
- b) A food security researcher wishes to estimate the mean weekly food consumption among children of a neighborhood care point in Lomahasha. After making a scheme, which enables him to determine the food consumption of a child during a week, he conducts a survey and finds that a standard deviation of the weekly food consumption is about 85g. He considers taking a random sample of 25, 100 and 625 children.
- i) Estimate the standard error of each of the samples. (6 marks)
- ii) How do the standard errors explain why large samples are more reliable? (2 marks)
- iii) Discuss any two types of sampling that a researcher could use and state how they can ensure randomization in each sample. (4 marks)
- c) A researcher obtained 10 soil samples and weighed them as follows:
185mg, 172 mg, 181 mg, 178 mg, 160 mg, 189 mg, 165 mg, 175 mg, 177 mg, 178 mg
- i) Calculate the 25th and 75th percentile of the above soil samples. (5 marks)
- ii) Calculate the 40th percentile (P40) of the soil samples distribution. (5 marks)
- iii) Calculate the median of the soil sample distribution. (4 marks)
- (30 Marks)**

QUESTION 3

- a) In a sample of 65 maize farmers in the Lubombo region, a researcher found that the mean and standard deviation of their harvest in tons were 12.2 tons and 1.8 tons respectively.
- i) Calculate the 95% confidence interval in which the true mean of all maize farmers' harvest in Lubombo region is likely to lie. (5 marks)
- ii) Similarly, the researcher wanted to know if farmers used fertilizer during maize farming and found that 30 out of 65 farmers (30/65) applied fertilizer during farming. Construct a 95% confidence interval in which the true proportion of all farmers who used fertilizer in the Lubombo region is likely to lie. (5 marks)

- iii) What would be your conclusion on the true proportion of farmers who used fertilizer based on the confidence interval you have calculated? (2 marks)
- b) Explain the following: (3 marks)
- i) The difference between a correlation and a regression. (3 marks)
 - ii) How do we make inference from a linear regression (3 marks)
- e) Define the following statistical terms used in research data analysis:
- i) Observational units
 - ii) Variable, characteristic
 - iii) Values, categories
 - iv) Ecological fallacy
 - v) Hypothesis
 - vi) Population
 - vii) Inference
 - viii) Study population
- (12 marks)
(30 Marks)

QUESTION 4

Discuss some of the critical factors a researcher must consider when formulating a research problem. (30 Marks)

QUESTION 5

Critically discuss any four (4) main goals of scientific research. (30 Marks)

Appendix 1

Formulae

mean

$$SE = \frac{s}{\sqrt{n}} \quad [\bar{x} - 1.96*SE, \bar{x} + 1.96*SE]$$

Proportion

$$[p - 1.96*SE, p + 1.96*SE], \text{ where } SE = \sqrt{\frac{p(1-p)}{n}}$$

Regression

$$R - \text{squared} = \frac{\text{Model SS}}{\text{Total SS}}$$

Confidence interval for the difference in means

$$SE = s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} \quad \text{and} \quad s = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$