



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

**SCHOOL OF AGRICULTURE AND NATURAL RESOURCE SCIENCES
DEPARTMENT OF NATURAL RESOURCES SCIENCES**

QUALIFICATION: BACHELOR OF NATURAL RESOURCES MANAGEMENT HONOURS	
QUALIFICATION CODE: 08BNRH	LEVEL: 8
COURSE CODE: RMC811S	COURSE NAME: RESEARCH METHODS FOR NATURAL SCIENCES
DATE: JULY 2023	
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER(S)	Dr Tendai Nzuma (Section A: Scientific Writing) Dr Meed Mbidzo (Section B: Statistics)
MODERATOR:	Dr M. Mwale

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Examination question paper
2. Answering book
3. Calculator

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Excluding this front page)

SECTION A: SCIENTIFIC WRITING

QUESTION 1

Discuss the importance of ethical considerations in scientific research and provide an example of an ethical issue that researchers in Namibia may face. [10]

QUESTION 2

Describe the process of peer review in scientific publishing and explain its importance. Provide an example of a peer-reviewed article from a journal published in Namibia. [10]

QUESTION 3

Explain the concept of plagiarism and its consequences in scientific writing. Provide an example of plagiarism from a research article conducted in Namibia. [10]

SECTION B: STATISTICS

QUESTION 4

What statistical procedure would you use for the following research questions and/or scenarios? [10]

- a) Concentrations of nitrogen oxides was determined in two urban suburbs. You want to test the hypothesis that the air pollutant was present in the same concentrations in the two suburbs. (2)
- b) A researcher wants to determine if there is a relationship between soil moisture content and nitrogen mineralization rates. (2)
- c) A researcher wishes to analyse how gender influences participation of local communities in natural resource decision making. Specifically, individual's attendance of meetings was determined. (2)
- d) Based on an anxiety score, students are divided into three groups: "low-stressed students", "moderately-stressed students" and "highly-stressed students. Exam performance is measured from 1 to 100. You want to test the hypothesis that exam performance differs based on exam anxiety levels amongst students? Assume that the data violates the assumptions of a parametric test. (2)
- e) Interest in conservation is believed to be influenced by level of education. Participants were classified into three groups according to their highest level of education; "high school", "college" or "university", in that order; The researcher is interested in determining whether the effect of education level on interest in conservation was different depending on gender. (2)

QUESTION 5

A wildlife ecologist is interested in investigating whether springbok foreleg and hindleg length are the same. To find this out, the ecologist measured the length of the left foreleg and left hindleg for ten (10) springboks. Use the SPSS outputs provided to answer questions that follow. [20]

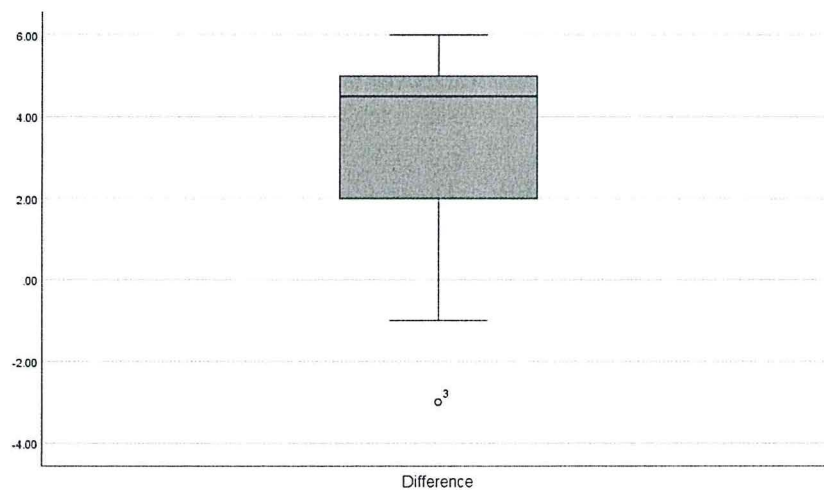
- a) What statistical test would you use to investigate whether the left foreleg and left hindleg (2)

lengths of springbok are equal or not.

- b) State the null and alternative hypotheses for this investigation. (2)
- c) Is the assumption of normality met or violated? Explain and provide evidence for your answer. (3)
- d) State whether the assumption of outliers is met or not (Explain and provide evidence for your answer. (3)
- e) Report on the descriptive statistics of the lengths of the springbok forelegs and hindlegs. (4)
- f) Determine whether forelegs and hindlegs of springbok were statistically significantly different in length. (6)

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Difference	.291	10	.017	.814	10	.021

a. Lilliefors Significance Correction



Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Hindleg length in cm	144.7000	10	3.40098	1.07548
	Foreleg length in cm	141.4000	10	4.03320	1.27541

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Hindleg length in cm - Foreleg length in cm	3.30000	3.05687	.96667	1.11325	5.48675	3.414	9	.008

QUESTION 6

A researcher is interested in determining whether the effect of education level on interest in conservation was different for male and female. Use the SPSS outputs provided to answer the question that follow. [20]

- What statistical test would you use to determine whether the effect of education level on interest in conservation is different for males and females (i.e., different depending on gender)? (2)
- State whether the assumption of normality in the test mentioned in (a) is met or not. (4)
- State whether the assumption of homogeneity of variances is met or not. (4)
- Explain how profile plots can be used to determine whether an interaction exists between two independent variables. (5)
- Determine whether there is a statistically significant interaction effect between gender and education level. (5)

Gender	Level of education		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
Male	School	Residual for conservation_interest	.143	9	.200*	.981	9	.971
	College	Residual for conservation_interest	.157	9	.200*	.957	9	.761
	University	Residual for conservation_interest	.213	10	.200*	.915	10	.320
Female	School	Residual for conservation_interest	.112	10	.200*	.963	10	.819

	College	Residual for conservation_interest	.112	10	.200*	.963	10	.819
	University	Residual for conservation_interest	.139	10	.200*	.950	10	.668

		Levene Statistic	df1	df2	Sig.
Conservation interest	Based on Mean	2.269	5	52	.061
	Based on Median	2.205	5	52	.068
	Based on Median and with adjusted df	2.205	5	27.511	.083
	Based on trimmed mean	2.263	5	52	.062

Tests of Between-Subjects Effects						
Dependent Variable: Conservation interest						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5645.998 ^a	5	1129.200	78.538	.000	.883
Intercept	132091.906	1	132091.906	9187.227	.000	.994
gender	8.420	1	8.420	.586	.448	.011
education_level	5446.697	2	2723.348	189.414	.000	.879
gender * education_level	210.338	2	105.169	7.315	.002	.220
Error	747.644	52	14.378			
Total	140265.750	58				
Corrected Total	6393.642	57				
a. R Squared = .883 (Adjusted R Squared = .872)						

QUESTION 7

Discuss how you would deal with outliers resulting from the following:

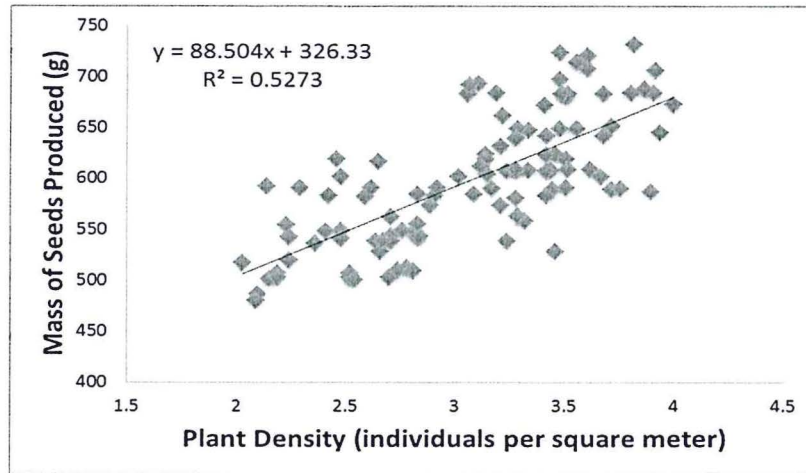
[10]

- a) Data entry error (2)
- b) Measurement errors (3)
- c) Genuinely unusual values (5)

QUESTION 8

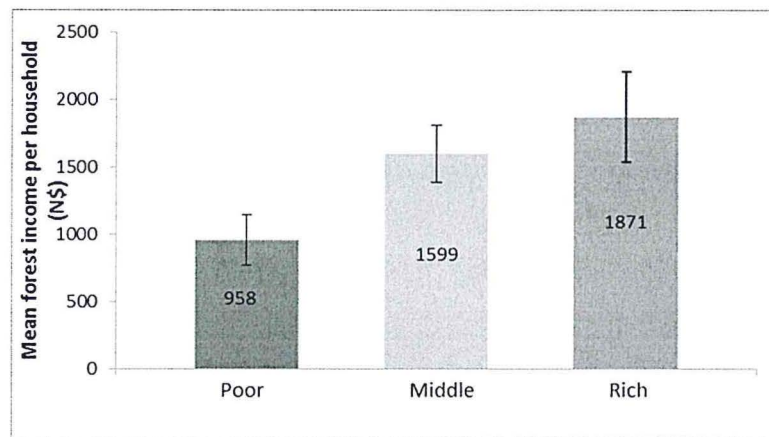
For each of the figures and additional information given below, provide a verbal description of the results. [10]

a)



(4)

b)



(3)

c) Table x: Nutrient concentrations of *Panicum maximum* growing on the granitic site under two grazing conditions. HG and LG denote high and low grazing intensity, respectively. Interpret only results for carbon (C) and C:N ratios. For the C:N ratios, the statistics p-value is 0.6827. (3)

	N %	C%	C: N	P%	Ca%	Mg%	K%	Na%
HG	0.87±0.08	40.38±0.26	48.33±4.18	0.06±0.01	0.88±0.06	0.21±0.01	0.42±0.06	0.06±0.01
LG	0.83±0.07	40.75±0.36	50.95±4.59	0.05±0.01	0.90±0.04	0.20±0.01	0.32±0.02	0.05±0.01

TOTAL PAPER MARKS

[100]