"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

REM 500 RESARCH METHODS

END OF FIRST SEMESTER EXAMINATIONS

March Intake 2019

LECTURER: E. CHIKAKA

DURATION: 3 HRS

INSTRUCTIONS

Answer **ALL** Questions in **Section A** and **ANY 3** questions from **Section B**

The mark allocation for each question is indicated at the end of the question

Credit will be given for logical, systematic and neat presentations.

SECTION A: ANSWER ALL QUESTION [40%]

1. (a) Giving relevant examples define QUALITATIVE research [3]
   (b) Describe briefly the outline of a QUANTITATIVE research proposal [10]

2. Discuss how as a researcher, you address ethical considerations before carrying out your research [8]

3. (a) Here are the scores attained by the students in the recent in-class exam
18; 100;27; 52; 85; 61; 68; 82; 54; 87; 91; 34;78; 93; 59

i. Establish the minimum, lower quartile, median, and upper quartile and maximum [6]
ii. Draw a stem and leaf and Box-and-Whisker Plot to show the distribution of the data [10]
iii. Which graphs describes the data best and why? [3]

SECTION B: ANSWER ANY THREE (3) QUESTIONS [60%]

4. Define briefly a questionnaire as a data collection tool [3]
(b) What are the characteristics of a good questionnaire [10]
(c) Briefly explain with examples why respondents may refuse to be interviewed.[7]

5. (a) What are the goals of Health Research? [10]

(b) Discuss the following:
(i) An experimental research design (2)
(ii) Descriptive research design (2)
(iii) Correlational design (2)
(iv) Exploratory design (2)
(v) Before and after design (2) [10]

6. (a) Developing a research problem statement is the most important process in research, discuss [10]

(b) What do you understand by the term "Sampling" in research process and what are the advantages of sampling to a researcher? . [10]

7. (a) What is test of significance**?** **[5]**
(b) A teacher contacted a test in Mathematics for 40 boys and 40 girls in two different schools and set out to determine whether or not the mean scores for the two groups differed significantly. Test the significant difference between the mean at level of 0.05, using the data in table 1 below [15]

Table 1: Students Performance

	Mean (Ẍ)	Standard Deviation (Ơ)/SD	N
Boys (a)	18	2.5	30
Girls (b)	25	2.0	30

8 Reliability is one of the basic attributes of a good test

(a) Define with example the term 'reliability' [3]

(b) Describe briefly two types of reliability [6]

(c) On Table 2 are the raw scores obtained by students on test 1 (X) and Re-test 2 (Y) administered by a researcher. The researcher wants to know if test 1 and 2 are measuring the same kind of ability in Biostatistics

Table 2: Students Scores in Biostatistics Test

Name of Student	Score in Test Exercise (X)	Score in Re-Test Exercise (Y)
Tendai	70	78
Lovemore	75	90
Victoria	63	77
Heather	80	69
Yemisi	92	70
Nyarai	77	76
Tsitsi	60	55

(i) Use the above raw scores to help the researcher to find the reliability coefficient of the test using Pearson's Product Moment Correlation Coefficient (r) for raw data formula. [8]

(ii) On the basis of the computed (r), are the two tests measuring the same kind of ability? Give reasons for your answer. [3]

$SE_{\acute{X}=\frac{S}{\sqrt{n}}}$ $P(K \le x \text{ ◌ } n, p) = \sum_{k=0}^{\Delta} \binom{n}{k} p^k q^{n-k}$

$S^2 = \frac{\sum (x - \acute{X})^2}{n-1}$ $S_2^2 = \sum ¿¿¿$ $Z = \acute{X} - \frac{¿}{\frac{\sigma}{\sqrt{n}}}¿$

$t_{,} = \acute{X} - \frac{¿}{\frac{S}{\sqrt{n}}}¿$ $t^2 = \frac{\acute{X}_{,} - \acute{X}_2}{S_p \sqrt{¿¿}}$

A 100 (1- α) % confidence interval (CI) for $\mu_1 - \mu_2$ is given by:

$(\bar{x}_1 - \bar{x}_2) \pm t_{crit} \times \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$ $z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\bar{p}\bar{q}/n_1 + \bar{p}\bar{q}/n_2}}$ where $\bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$

$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_{p^2}}{n_1} + \frac{s_{p^2}}{n_2}}}$ $S^2{}_P = \frac{(n_{,} - 1) S_{,}{}^2 + (n_{,} - 1) S_2^2}{n_{,} + n^2 - 2}$

$Z = \acute{X} - \frac{¿}{\frac{\sigma}{\sqrt{n}}}¿$ $r = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n(\sum x^2) - (\sum x)^2][n(\sum y^2) - (\sum y)^2]}}$ $S^2{}_P = \frac{(n_{,} - 1) S_{,}{}^2 + (n_{,} - 1) S_2^2}{n_{,} + n^2 - 2}$

95% CI for a proportion $= p \pm 1.96 \sqrt{\frac{p(1-p)}{n}}$

95% CI for a mean = $\bar{X}$ ± 1.96 Ó/√n $t = r \frac{\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$ $r_{,} = \frac{\sum (x - \acute{X})(y - \acute{Y})}{\sqrt{¿¿}}$

$b_{,} = \frac{\sum (x - \acute{X})(y - \acute{Y})}{\sum (x - \acute{X})^2}$ $r_{,} = \frac{\sum (x - \acute{X})(y - \acute{Y})}{\sqrt{¿¿}}$ $b_2 = \sum xy - ¿¿¿¿$ $b_0 = \acute{Y} - b_1 \acute{X}$

$^2 = \sum \frac{(O-E)^2}{E}$ $t = r \frac{\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$

$SE_b = \frac{S}{\sqrt{\sum (x - \acute{X})^2}}$ where $S^2 = \frac{\sum (y - \acute{Y})^2 - b^2 \sum (x - \acute{X})^2}{n-2}$ $^2 = \sum \frac{(\text{◌} O - E \text{◌} - 0.5)^2}{E}$

$$b_{.} = \frac{\sum (x - \acute{X})(y - \acute{Y})}{\sum (x - \acute{X})^2}$$

$$n_1 = \frac{\left[z_{\alpha/2} \sqrt{(r+1)\bar{p}\bar{q}} + z_{1-\beta} \sqrt{r p_1 q_1 + p_2 q_2} \right]^2}{r(p_1 - p_2)^2} \qquad n_2 = r \times n_1$$

$$b_2 = \sum xy - ¿¿¿¿$$

$$SE_b = \frac{S}{\sqrt{\sum (x - \acute{X})^2}} \; where \; S^2 = \frac{\sum (y - \acute{Y})^2 - b^2 \sum (x - \acute{X})^2}{n-2}$$

95% CI for OR =

$$e^{\ln(\mathrm{OR}) \pm 1.96 \cdot \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}}$$

95% CI for RR =

$$e^{\ln(\mathrm{RR}) \pm 1.96 \cdot \sqrt{\frac{b}{a(a+b)} + \frac{d}{c(c+d)}}}$$