AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

REM 500 RESESEARCH METHODS

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2018

LECTURER(S): MUNGURE S & CHIKAKA E

3HRS

INSTRUCTIONS

Answer **ALL** Questions in Section A and **Any TWO (2)** 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: compulsory (40%)

Question 1

1 A farmer went looking for mangoes for his fifteen orchard trees orchard and made the following records; 0; 4; 0; 1; 2; 3; 4; 2; 0; 5; 4; 5; 6; 0; 7

Find the

(a) Mode [2]

(b) median [2]

(c) mean [4]

(d) Calculate the variance and the standard deviation and standard error of this data [10]

(e) 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 lower quartile, median, and upper quartile [6]

ii. Identify skewness of the data [3]

iii. Draw a stem and leaf to show the distribution of the data [5]

(f) Explain how the Chi-Square ($\chi 2$) is an important statistic in Quantitative research? [4]

(g) Using data in (e) illustrate the relevance of a bar graph in Quantitative research [4]

SECTION B Answer Any TWO (2) Questions (60%)

2. Demonstrate and explain in detail the differences between
   a. Qualitative and quantitative research [10]
   b. Systematic and stratified sampling [10]
   c. Descriptive and inferential statistics [10]

3. Theory and literature review provide the necessary foundation for developing coherent research. How exactly do these two help the researcher? [30]

4. a. Describe the evolution of research ethics taking account of the major milestones since the end of World War 2. [15]
   b. Explain how you would observe the main principles of research ethics in a research of your choice. [15]

5. Explain the following terms as they relate to the practice of research (you can also illustrate your response). Your explanations have to be thorough and exhaustive.

a. Population [5]

b. Random sample [5]

c. Hawthorne effect [5]

d. Paradigms [5]

e. Cultural competence [5]

f. Randomisation [5]

Standard Error = $SE_{\bar{X}} = \frac{s}{\sqrt{n}}$ $P(K \leq x \mid n, p) = \sum_{k=0}^{\Delta} \binom{n}{k} p^k q^{n-k}$

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

$t_1 = \frac{\bar{X}-\mu}{\frac{s}{\sqrt{n}}}$ $t^2 = \frac{\bar{X}_1 - \bar{X}_2}{S_p\sqrt{(1/n_1 + 1/n_2}}$

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 $\bar{p} = \frac{x_1 + x_2}{n_1 + n_2}$

$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_p^{\ 2}}{n_1} + \frac{s_p^{\ 2}}{n_2}}}$ $S^2{}_P = \frac{(n_1-1)S_1^2 + (n_1-1)S_2^2}{n_1 + n^2 - 2}$

$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n(\sum x^2) - (\sum x)^2][n(\sum y^2) - (\sum y)^2]}}$ 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 $t = r\frac{\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$ $r_1 = \frac{\sum(x-\bar{X})(y-\bar{Y})}{\sqrt{[\sum(x-\bar{X})^2 \sum(y-\bar{Y})^2]}}$

$b_1 = \frac{\sum(x-\bar{X})(y-\bar{Y})}{\sum(x-\bar{X})^2}$ $b_2 = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$ $b_0 = \bar{Y} - b_1\bar{X}$ $\chi^2 = \sum \frac{(O-E)^2}{E}$

$SE_b = \frac{s}{\sqrt{\sum(x-\bar{X})^2}}$ *where* $S^2 = \frac{\sum(y-\bar{Y})^2 - b^2\sum(x-\bar{X})^2}{n-2}$ $\chi^2 = \sum \frac{(|O-E| - 0.5)^2}{E}$

$n_1 = \frac{\left[z_{\alpha/2}\sqrt{(r+1)\bar{p}\bar{q}} + z_{1-\beta}\sqrt{rp_1q_1 + p_2q_2}\right]^2}{r(p_1 - p_2)^2}$ $n_2 = r \times n_1$

95% CI for OR = $e^{\ln(OR) \pm 1.96 \cdot \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}}$

95% CI for RR = $e^{\ln(RR) \pm 1.96 \cdot \sqrt{\frac{b}{a(a+b)} + \frac{d}{c(c+d)}}}$