AFRICA UNIVERSITY
A United Methodist-Related Institution

"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

RESEARCH METHODS (NREM500)

FINAL EXAMINATION

NOVEMBER 2022

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3 HOURS

INSTRUCTIONS

Answer **All** questions in Section A and any **Two (2)** Questions in Section B.

Start **each** question on a new page in your answer booklet.

The marks allocated to **each** question are shown at the end of the question.

Show all your workings.

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

SECTION A: ANSWER ALL QUESTIONS

1. Given the following research questions:

   - How do the rural and urban residents compare in health outcomes and patient satisfaction among low-income people with chronic illnesses?
   - What effect do different legal approaches have on the number of people who drive after drinking in African countries?
   - How have economic, political, and social factors affected patterns of homelessness in urban areas in Africa over the past five years?
   - What impact have university internationalisation policies had on the availability and affordability of housing in Africa?

   a) Select a question and write the methodology for the research. [**25 marks**]
   b) Discuss the ethical issues in the research question you selected. Briefly discuss the origin of the ethical codes and guidelines in research. [**25 marks**]

SECTION B: ANSWER ANY TWO (2) QUESTIONS

2. An educational researcher is interested in the relationship between students' participation in two after school programmes and academic achievement. The researcher states the hypothesis: "Children who participate in an after school programme that emphasises critical thinking skills will score higher on measures of academic achievement and self-esteem than students who participate in a programme that emphasises rote memorisation".

   a) Discuss the different forms of literature review. [**20 marks**]
   b) Which literature review form is appropriate for this research and why? [**5 marks**]

3. *Research Title*: "A Theoretical Assessment of the Operational Budgets in Hyperinflation Countries, Lessons from Boarding Schools in Zimbabwe: Effects and Survival Strategies".

   Research Objectives: The main objective of the research was to identify a theoretical relationship between hyperinflation and the operational budget of boarding schools in Zimbabwe. The specific objectives were to assess the causes of hyperinflation; evaluate the effects of hyperinflation on operational budgets of boarding schools, and assess the survival strategies being adopted by boarding schools in Zimbabwe in times of hyperinflationary (Mandongwe, Murairwa, & Dube, 2022).

   a) Discuss the different types of research. [**20 marks**]
   b) Which research type is appropriate for this research and why? [**5 marks**]

4. *Research Title*: "Inclusive Pedagogy: Teaching Methodologies to Reach Diverse Learners in Science Instruction"

   Research Purpose: The purpose was to identify barriers to the adoption of inclusive teaching methods for diverse learners and students with disabilities and to propose ways to break down these barriers (Moriarty, 2007).

   a) Identify the data gathered for the research. [**5 marks**]
   b) Develop a template for analysing the research data. [**20 marks**]

End of paper

ADDITIONAL INFORMATION

1. Sturge's Rule:

Number of class, $C = 1 + 3.3 \log n$

Class width, $i > \frac{range}{C}$

2. Mean of grouped data $= \frac{\sum_{i=1}^{n} fx_i}{n}$

3. Mean of ungrouped data $= \frac{\sum_{i=1}^{n} x_i}{n}$

. Mode $= L_{mo} + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2} \right) i$

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5 Median $= L_{me} + \left(\frac{\frac{n}{2} - F}{f_m} \right) i$

6. Standard deviation: $s = \sqrt{\frac{\sum_{i=1}^{n} fx_{i^2} - \frac{\left(\sum_{n=1}^{n} fx_i \right)^2}{n}}{n-1}}$

7. Standard Deviation of ungrouped data: $s = \sqrt{\frac{\sum_{i=1}^{n} x_{i^2} - \frac{\left(\sum_{i=1}^{n} x_i \right)^2}{n}}{n-1}}$

8. Coefficient of skewness: $S_k = \frac{3(mean - median)}{s} = \frac{mean - \mathrm{mod}\, e}{s}$

9. Conditional probability: $P(A¿) = \frac{P(A \cap B)}{P(A)}$

10. Binomial Distribution

- $P(X = x) = nC_x p^x q^{n-x}$

11. Poisson Distribution

- $P(X = x) = \frac{e^{-\lambda} \lambda^x}{x!}$

12. Hypothesis testing (single mean)

- $Z=\dfrac{\overline{X}-\mu}{\dfrac{\sigma}{\sqrt{n}}}$
- $t=\dfrac{\overline{X}-\mu}{\dfrac{s}{\sqrt{n}}}$, df = n – 1

13. Hypothesis testing (single proportion)
- $Z=\dfrac{p-\pi}{\sqrt{\dfrac{\pi(1-\pi)}{n}}}$

14. Hypothesis testing (difference of two means)
- $Z=\dfrac{\overline{X}_1-\overline{X}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1}+\dfrac{\sigma_2^2}{n_2}}}$
- $t=\dfrac{\overline{X}_1-\overline{X}_2}{\sqrt{\dfrac{S_1^2}{n_1}+\dfrac{S_2^2}{n_2}}}$, df = smaller $(n_1-1; n_2-1)$
- $t=\dfrac{\overline{X}_1-\overline{X}_2}{\sqrt{\dfrac{S_p^2}{n_1}+\dfrac{S_p^2}{n_2}}}$

  Where $S_p^2=\dfrac{S_1^2(n_1)+S_2^2(n_2)}{n_1+n_2-2}$, $df=n_1+n_2-2$
- $t=\dfrac{\overline{D}-\mu_D}{\dfrac{S_D}{\sqrt{n}}}$, df = n – 1

15. Hypothesis testing (difference of two proportions)
- $Z=\dfrac{p_1-p_2}{\sqrt{\overline{p}\,\overline{q}\left(\dfrac{1}{n_1}+\dfrac{1}{n_2}\right)}}$

16. Confidence Interval (Single mean)
- $\overline{X}-Z_{\frac{\alpha}{2}}\dfrac{\sigma}{\sqrt{n}}\le\mu\le\overline{X}+Z_{\frac{\alpha}{2}}\dfrac{\sigma}{\sqrt{n}}$
- $\overline{X}-t_{\frac{\alpha}{2}}\dfrac{S}{\sqrt{n}}\le\mu\le\overline{X}+t_{\frac{\alpha}{2}}\dfrac{S}{\sqrt{n}}$

17. Confidence Interval (Difference of two means)
- $(\overline{X}_1-\overline{X}_2)-Z_{\frac{\alpha}{2}}\sqrt{\dfrac{\sigma_1^2}{n_1}+\dfrac{\sigma_2^2}{n_2}}\le(\mu_1-\mu_2)\le(\overline{X}_1-\overline{X}_2)+Z_{\frac{\alpha}{2}}\sqrt{\dfrac{\sigma_1^2}{n_1}+\dfrac{\sigma_2^2}{n_2}}$

- $(\overline{X}_1-\overline{X}_2)-t_{\frac{\alpha}{2}}\sqrt{\frac{S_1^2}{n_1}+\frac{S_2^2}{n_2}}\le(\mu_1-\mu_2)\le(\overline{X}_1-\overline{X}_2)+t_{\frac{\alpha}{2}}\sqrt{\frac{S_1^2}{n_1}+\frac{S_2^2}{n_2}}$
  $df=$ smaller $(n_1-1;n_2-1)$
- $(\overline{X}_1-\overline{X}_2)-t_{\frac{\alpha}{2}}\sqrt{\frac{S_p^2}{n_1}+\frac{S_p^2}{n_2}}\le(\mu_1-\mu_2)\le(\overline{X}_1-\overline{X}_2)+t_{\frac{\alpha}{2}}\sqrt{\frac{S_p^2}{n_1}+\frac{S_p^2}{n_2}}$
  Where $S_p^2=\frac{S_1^2(n_1)+S_2^2(n_2)}{n_1+n_2-2}$, $df=n_1+n_2-2$

18. Confidence Interval (Single proportion)
    - $p-Z_{\frac{\alpha}{2}}\sqrt{\frac{pq}{n}}\le\pi\le p+Z_{\frac{\alpha}{2}}\sqrt{\frac{pq}{n}}$

19. Confidence Interval (Difference of two proportions)
    - $(p_1-p_2)-Z_{\frac{\alpha}{2}}\sqrt{\frac{p_1q_1}{n_1}+\frac{p_2q_2}{n_2}}\le(\pi_1-\mu_2)\le(p_1-p_2)+Z_{\frac{\alpha}{2}}\sqrt{\frac{p_1q_1}{n_1}+\frac{p_2q_2}{n_2}}$

20. Standardisation: $Z=\frac{X-\mu}{\sigma}$

21. Weighted Mean: $\overline{X}_w=\frac{\sum xw}{\sum w}$

$$P(B_i/C)=\frac{P(C/B_i)P(B_i)}{\sum_{i=1}^{n}P(C/B_i)P(B_i)},$$

22. Bayes Theory:

23. Regression and Correlation Analysis:

$$y=\beta_0+\beta_1x+e,$$

$$\beta_1=\frac{n\sum xy-\sum x\sum y}{n\sum y^2-\left(\sum y\right)^2}$$

$$\beta_0=\overline{y}+\beta_1\overline{x}$$

$$r=\frac{n\sum xy-\sum x\sum y}{\sqrt{\left\{\left(n\sum x^2-\left(\sum x\right)^2\right)\left(n\sum y^2-\left(\sum y\right)^2\right)\right\}}}$$

24. Chi-square Test:

Let f_0 and f_e be the observed and expected frequencies respectively:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$