AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

RESEARCH METHODS (REM500)

FINAL EXAMINATION

NOVEMBER 2018

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3 HOURS

INSTRUCTIONS

Answer **All** questions.

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.

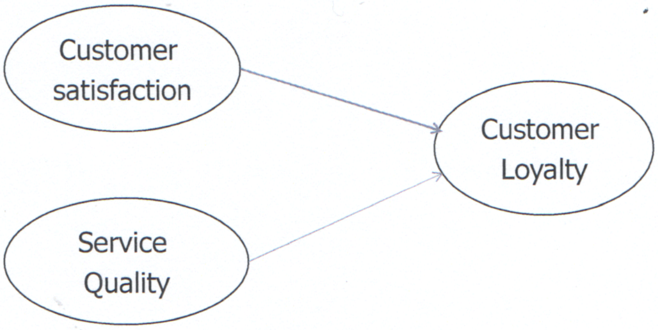
Credit will be given for logical, systematic and neat presentations.

1. Discuss the following:
   (a) Experiment. **[4 marks]**
   (b) Independent variable. **[4 marks]**
   (c) Longitudinal research design. **[4 marks]**

2. A research is a systematic means of problem solving (Tuckman, 1978).
   a) Explain how you would design a Mixed Methods study. **[10 marks]**
   b) Discuss the process of data analysis in qualitative research. Describe also the role of the constant comparative method. **[10 marks]**

3. Questionnaires are often used to assess people attitudes to current events and to factors affecting attitude change. Researchers have obtained information on such diverse topics as attitudes to body image and attitudes to drinking and driving. This information has enabled research in the factors affecting attitude to change. Explain how you would carry out a questionnaire into "Attitudes to parental discipline". Justify your decisions as part of your explanation. **[20 marks]**

4. A conceptual framework for a research is presented in the figure below.



   a) Suggest a topic for the research. **[2 marks]**
   b) Write the problem statement and the objectives of the research. **[8 marks]**
   c) Explain two methods of collecting primary data for the research **[8 marks]**
   d) Write the methodology of the research. **[10 marks]**

5. A researcher has conducted a correlational study to investigate the relationship between how important a person thinks appearance is and how much they spend on clothes each month. The first variable was 'self-rating of the importance of appearance' measured on a ten point scale (where 1 = not important and 10 = extremely important). The second variable was "amount of money spent on clothes each month" measured by asking people to estimate to the nearest five pounds how much they spent in a typical month. The results are in the table below.

Participants (Initials)	Self-rating of importance of appearance	Amount spent on clothes each month ($)
HA	6	80
EP	8	120
SF	9	100
PR	3	110
MS	7	75
JP	4	35
AG	3	15
BF	5	50

a) Describe how data is presented in a scatter graph. **[2 marks]**

b) Sketch an appropriately labelled scatter graph displaying the results of this study. **[4 marks]**

c) What could this graph tell you about the relationship between the two variables? **[3 marks]**

d) Outline two conclusions from the data in this scatter graph. **[4 marks]**

e) Explain what is meant by the descriptive statistic called the mean. **[2 marks]**

f) When would the descriptive statistic called the 'median' be more appropriate and why? **[4 marks]**

g) What is the range for the amount of money spent on clothes each month? **[1 mark]**

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 $= \frac{\sum_{i=1}^{n} x_i}{n}$

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

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: $S_k = \frac{3(mean - median)}{s} = \frac{mean - mode}{s}$

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

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)
    - $Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$
    - $t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$, $df = n - 1$

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

14. Hypothesis testing (difference of two means)

- $Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$
- $t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$, df = smaller $(n_1 - 1;\ n_2 - 1)$
- $t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_p^2}{n_1} + \frac{S_p^2}{n_2}}}$

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

15. Hypothesis testing (difference of two proportions)

- $Z = \frac{p_1 - p_2}{\sqrt{\bar{p}\bar{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$

16. Confidence Interval (Single mean)

- $\bar{X} - Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} \leq \mu \leq \bar{X} + Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$
- $\bar{X} - t_{\frac{\alpha}{2}} \frac{S}{\sqrt{n}} \leq \mu \leq \bar{X} + t_{\frac{\alpha}{2}} \frac{S}{\sqrt{n}}$

17. Confidence Interval (Difference of two means)

- $(\bar{X}_1 - \bar{X}_2) - Z_{\frac{\alpha}{2}} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} \leq (\mu_1 - \mu_2) \leq (\bar{X}_1 - \bar{X}_2) + Z_{\frac{\alpha}{2}} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$
- $(\bar{X}_1 - \bar{X}_2) - t_{\frac{\alpha}{2}} \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \leq (\mu_1 - \mu_2) \leq (\bar{X}_1 - \bar{X}_2) + t_{\frac{\alpha}{2}} \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$

  df = smaller $(n_1 - 1;\ n_2 - 1)$
- $(\bar{X}_1 - \bar{X}_2) - t_{\frac{\alpha}{2}} \sqrt{\frac{S_p^2}{n_1} + \frac{S_p^2}{n_2}} \leq (\mu_1 - \mu_2) \leq (\bar{X}_1 - \bar{X}_2) + t_{\frac{\alpha}{2}} \sqrt{\frac{S_p^2}{n_1} + \frac{S_p^2}{n_2}}$

  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)

- $p - Z_{\frac{\alpha}{2}} \sqrt{\frac{pq}{n}} \leq \pi \leq p + Z_{\frac{\alpha}{2}} \sqrt{\frac{pq}{n}}$

19. Confidence Interval (Difference of two proportions)

- $(p_1 - p_2) - Z_{\frac{\alpha}{2}} \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}} \leq (\pi_1 - \mu_2) \leq (p_1 - p_2) + Z_{\frac{\alpha}{2}} \sqrt{\frac{p_1 q_1}{n_1} + \frac{p_2 q_2}{n_2}}$

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

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

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

23. $y = \beta_0 + \beta_1 x + e$,

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

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

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

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

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