UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION PAPER – MAY 2005

TITLE OF PAPER	:	RESEARCH METHODS AND STATISTICS
COURSE CODE	:	HSC 301
TIME	:	3 HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER **SIX QUESTIONS** IN ALL.
	:	ANSWER **FOUR** QUESTIONS FROM SECTION A AND **TWO** QUESTIONS FROM SECTION B
	:	NO FORM OF ANY PAPER SHOULD BE BROUGHT INTO NOR OUT OF THE EXAMINATION ROOM
	:	BEGIN THE ANSWER TO EACH QUESTION ON A SEPARATE SHEET OF PAPER
	:	ALL CALCULATIONS/WORKOUT DETAILS SHOULD BE SUBMITTED WITH YOUR ANSWER SHEET
	:	A **FORMULA SHEET** AND **GRAPH PAPER** ARE PROVIDED FOR YOU
	:	CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPE

DO NOT OPEN THIS EXAMINATION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

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SECTION A : INTRODUCTION TO HEALTH STATISTICS

PART A : Answer **ALL** the questions in this section.

QUESTION 1

a. Determine whether the data from the following statements is discrete or continuous.

i. A simple random sample of 14 restaurants is visited and checked for the presence or absence of each of a dozen possible lapses from good hygiene practice.

ii. A researcher wants to find the average lengths of time heads of households with different tenures have resided at their addresses.

iii. A nurse wants to determine if overcrowding is a predisposing factor for tuberculosis transmission in a peri-urban settlement.

iv. An environmental Health Officer wants to determine if correct temperatures are maintained during the transportation of carcasses and cuts, offals, poultry and meat products.

v. A medical doctor wants to diagnose a group of patients with symptoms of food poisoning and collects the incubation periods from each one of them.

(5)

b. Determine whether the data from the following statements are qualitative or quantitative.

i. A researcher wants to compare the rate of cervical cancer among women who have been exposed to the herpes virus and among those not exposed.

ii. A psychologist does a study to determine the relationship between delinquency and family size. He uses the following key to classify his results : 0 – 3 members – small family, 4 – 6 members – medium family, 7+ members – large family.

iii. A nurse wants to determine if the marital status is an issue in the rate of survival of babies born at a hospitals.

iv. A psychiatrist wants to determine the mental status of patients on admission.

v. An experimenter uses lab animals to determine if ultrasound examinations can cause low birth weight.

(5)

[10 marks]

QUESTION 2

As part of a research project, investigators obtained the following data on serum lipid peroxide (SLP) levels from laboratory reports of a sample of 10 adult subjects undergoing treatment for diabetes mellitus :

5.85 6.17 6.09 7.70 3.17 3.83 5.17 4.31 3.09 5.24

a. For these data compute the :
   i. mean (2)
   ii. median (2)
   iii. variance, and (2)
   iv. standard deviation (2)

b. Given that the mean SLP value for a sample of 10 healthy adults is 3.80, explain what the results in (a) above suggest regarding SLP levels among patients with and without diabetes mellitus.

[10 marks]

QUESTION 3

a. In a certain high school class consisting of 60 girls and 40 boys, it is observed that 24 girls and 16 boys wear eyeglasses. If a student is picked up at random from this class, the probability that the student wears glasses, P(E), is 40/100 or 0.4.

   i. What is the probability that a student picked at random wears glasses, given that the student is a boy ? (2)
   ii. Are the events "being a boy" and "wearing eyeglasses" for this group independent ? Explain your response. (2)
   iii. What is the probability of the joint occurrence of the events of wearing glasses and being a boy ? (2)

b. *Clasen et al.* studied the oxidation of sparteine and mephenytoin in a group of subjects living in Greenland. A simple random sample of size 10 is selected from the population. The table below is a frequency distribution of ages of 169 subjects.

Class Interval	Frequency
10 – 19	4
20 – 29	66
30 – 39	47
40 – 49	36
50 – 59	12
60 – 69	4
TOTAL	169

   i. Represent this information on a histogram. (3)
   ii. Write a plausible interpretation of your histogram. (1)

[10 marks]

PART B : ANSWER **ANY TWO** QUESTIONS FROM THIS PART.

QUESTION 4

The following table shows the number of hours 45 hospital patients slept following the administration of a certain anaesthetic.

7	10	12	4	8	7	3	8	5
12	11	3	8	1	1	13	10	4
4	5	5	8	7	7	3	2	3
8	13	1	7	17	3	4	5	5
3	1	17	10	4	7	7	11	8

a. From this data construct :

i. a frequency distribution (3)
ii. a relative frequency distribution (2)

b. Use your frequency distribution to compute the :

i. mean (2)
ii. median (2)
iii. mode (2)
iv. standard deviation (2)
v. 80^{th} percentile (2)

[15 marks]

QUESTION 5

Castillo and Lillioja describe a technique they developed for peripheral lymphatic cannulation in humans. The authors claim that their technique simplifies the procedure and enables the collection of adequate volumes of lymph for kinetic and metabolic studies. The investigators' subjects were 14 healthy adult males representing a wide range of body weights. One of the variables on which measurements were taken was body mass index (BMI) = weight (kg) / height^2 (m^2). The results are shown in the table below :

Subject	BMI	Subject	BMI
1	23	8	24
2	25	9	32
3	21	10	57
4	37	11	23
5	39	12	26
6	21	13	31
7	23	14	45

We wish to know if we can conclude, at the 95% confidence level, that the mean BMI of the population from which the sample was drawn is not 35. Let $\propto = 0.05$

[15 marks]

QUESTION 6

The following table shows the body weight and plasma volume for 8 healthy males.

Subject	Body Weight (kg)	Plasma volume (l)
1	58.0	2.75
2	70.0	2.86
3	74.0	3.37
4	63.5	2.76
5	62.0	2.62
6	70.5	3.49
7	71.0	3.05
8	66.0	3.12

a. Draw a scatter diagram to illustrate the influence of body weight (x-axis) on plasma volume (y-axis). (3)
b. Fit a straight line to the data, and enter it on the scatter diagram. (9)
c. was there a significant relationship between plasma volume and body weight ? (3)

[15 marks]

SECTION B: RESEACH METHODS

QUESTION 7 20 MARKS

A Provide a statement that adequately communicates what "research" is (5)

B One of the general intended uses of research is to add to research -based knowledge and to advance further enquiry and methodology. However there are unique **purposes** and **intended uses** for different types of research.

Mention: One (1) unique purpose of Applied research

One (1) unique purpose of Evaluation research and

One (1) unique intended use for Evaluation research (15)

QUESTION 8 20 MARKS

A What is meant by "significance of a research problem" ? (2)

Mention and justify two criteria on which "**significance of a research problem**" may be placed. (8)

B When doing research there are many data collection strategies that may be considered by the researcher. Each has its unique characteristics, advantages and disadvantages.

Consider the two data collection techniques stated below, and discuss the disadvantage(s) that the researcher may have to contend with if they choose to use these data collection strategies . (10)

(i) Standardised interviews

(ii) Documents