

UNIVERSITY OF SWAZILAND
FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION PAPER – MAY 2010

TITLE OF PAPER : HEALTH STATISTICS

COURSE CODE : HSC 307

TIME : 2 HOURS

MARKS : 100

INSTRUCTIONS :

- : ANSWER **ALL** QUESTIONS FROM **SECTION A**
- : ANSWER **ANY TWO** QUESTIONS FROM **SECTION B**
- : NO FORM OF PAPER SHOULD BE BROUGHT INTO NOR TAKEN 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
- : CALCULATORS MAY BE USED BUT THEY MUST BE THE SILENT TYPES
- : A FORMULA SHEET, z AND t DISTRIBUTION TABLES, AND GRAPH PAPER ARE PROVIDED

SECTION A ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION 1

- a. Say whether the following variables are *discrete* or *continuous*.
- Amount of chloroguanide in the urine specimen of 216 Tanzanians who had taken the drug for malaria prophylaxis (1)
 - The number of decayed teeth per child at an elementary school (1)
 - Incidence of salmonellosis in Reykjavik in 2000. (1)
 - Number of patients who became ill after eating cheesecake out of the total who ate cheesecake (1)
 - Oral hygiene status of subjects using a plague index to determine the score for each subject (1)
- b. For each of the following variables, indicate whether it is *quantitative* or *qualitative*:
- Class standing of the members of the class relative to each other (1)
 - Admitting diagnosis of patients admitted to a mental health clinic (1)
 - Weights of babies born in a hospital during a year (1)
 - Gender of students admitted to the Environmental Health Programme each year (1)
 - Range of motion of elbow joint of students enrolled in a university health sciences curriculum (1)

[10 marks]

QUESTION 2

Spivack et al., (2003) investigated the severity of disease associated with *C. difficile* in paediatric inpatients. One of the variables they examined was number of days patients experienced diarrhoea. The data for the 22 subjects in the study appear below:

3	11	3	4	14	2	4	5	3	11	2
2	3	2	1	1	7	2	1	1	3	2

- a. Use the data for the 22 subjects to compute the:
- mean (2)
 - median (2)
 - mode (2)
 - standard deviation (2)
- b. Write down a plausible interpretation for the mean. (2)

[10 marks]

QUESTION 3

In a certain high school class, consisting of 60 girls and 40 boys, it is observed that 24 girls and 16 boys wear glasses.

- a. If a student is picked up at random from this class, what is the probability that the student:
 - i. is a boy? (2)
 - ii. wears eye glasses? (2)
 - iii. wears glasses given that the student is a boy? (3)
- b. What is the probability of the joint occurrence of the events of wearing eyeglasses and being a boy? (3)

[10 marks]

Question 4

Despite common knowledge of the adverse effects of doing so, many women continue to smoke while pregnant. Mayhew et al. examined the effectiveness of a smoking cessation program for pregnant women. The mean number of cigarettes smoked daily at the close of the programme by 328 women who completed the programme was 4.3 with a standard deviation of 5.22. Among 64 women who did not complete the programme, the mean number of cigarettes smoked per day at the close of the programme 13 with a standard deviation of 8.97.

- a. State any assumptions that make your method valid. (2)
- b. Construct a 95% and a 99% confidence interval for the difference between the means of the populations from which the samples may be presumed to have been selected. (6)
- c. Write a plausible interpretation for the 99% confidence interval. (2)

[10 marks]

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION

Question 5

The table below are ages of 189 subjects who participated in a study on smoking cessation.

Ages	Frequency
30 – 39	11
40 – 49	46
50 – 59	70
60 – 69	45
70 – 79	16
80 – 89	1
Total	189

- a. i. Represent this information on a histogram. (3)
- ii. Describe the data with respect to symmetry and skewness. (3)
- ii. Write a plausible interpretation of your histogram. (2)
- b. Use the data to compute the:
 - i. Mean (2)
 - ii. Median (2)
 - iii. Mode (2)
 - iv. Variance (2)
 - v. Standard deviation (2)
- c. Write a plausible interpretation for the mean. (2)

[20 marks]

Question 6

Nakamura et al., (2003) studied subjects with medial collateral ligament (MCL) and anterior cruciate ligament (ACL) tears. Between February 1995 and December 1997, 17 consecutive patients with combined acute ACL and grade III MCL injuries were treated by the same physician at the research centre. One of the variables of interest was the length of time in days between the occurrence of the injury and the first magnetic resonance imaging (MRI). The data are shown below.

Number of Days until MRI for Subjects with MCL and ACL Tears

Subject	Days	Subject	Days
1	14	10	21
2	9	11	28
3	18	12	24
4	26	13	24
5	12	14	2
6	0	15	3
7	10	16	14
8	4	17	9
9	8		

Source: Norimasa Nakamura, Shuji Horibe, Yukyoshi Toritsuka, Tomoki Mitsuoka, Hideki Yoshikawa, and Konsei Shino, "Acute Grade III Medial Ligament Injury of the Knee Associated with Anterior Cruciate Ligament Tear" *The American Journal of Sports Medicine*, 31 (2003), 261 – 267.

Can we conclude that the mean number of days between injury and initial MRI is not 15 days in a population presumed to be represented by these sample data? (20)

[20 marks]

Question 7

The following scores represent a nurse's assessment (X) and a physician's assessment (Y) of the condition of 10 patients at time of admission to a trauma centre.

X:	18	13	18	15	10	12	8	4	7	3
Y:	23	20	18	16	14	11	10	7	6	4

- Construct a scatter diagram for these data. (4)
- Describe the regression of the two assessments using the scatter diagram. (2)
- Obtain the regression equation and plot it on the scatter diagram (7)
- Calculate the coefficient of determination (4)
- Interpret your coefficient of determination. (2)

[20 marks]