



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

FIRST YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE MASTER OF SCIENCE IN NUTRITION AND
DIETETICS**

MAIN EXAMINATION

COURSE CODE: HPN 801

COURSE TITLE: ADVANCED STATISTICS

DATE: 19/04/2022

TIME: 8.00 -11.00 AM

INSTRUCTIONS TO CANDIDATES

This paper is divided into two sections, **A** and **B**, carrying respectively: Short answer questions (SAQs) and long answer questions.

(LAQs)

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

SECTION A: SHORT ANSWER QUESTIONS (40 Marks)
ANSWER ALL QUESTIONS IN THIS SECTION

1. a) Differentiate arithmetic, harmonic and geometric mean. (3 Marks)
b) Define the following; sample, parameter, statistic and variable (5 Marks)
2. a) Classify the following variables as nominal, ordinal, discrete or continuous. (4 Marks)
 - i. White blood cells per deciliter of whole blood
 - ii. Leukemia rates in geographic regions (cases per 100,000 people)
 - iii. Presence of type II diabetes mellitus (yes or no)
 - iv. Body weight (kg)
 - v. Low-density lipoprotein level (mg/dl)
 - vi. Ambient temperature (degrees Fahrenheit)
 - vii. Treatment group: 1 = active treatment, 2 = placebo
 - viii. Blood cholesterol level classified as either 1 = hypercholesterolemic, 2 = borderline hypercholesterolemic, 3 = normocholesterolemic
- b). Construct a stem and leaf plot for the following set of numbers; (4 Marks)
21, 33, 6, 29, 50, 103, 68, 24, 22, 31, 7, 44, 38, 114, 17, 2.
3. Given the following data set 66, 89, 41, 98, 76, 77, 69, 60, 60, 66, 69, 66, 98, 52, 74, 66, 89, 95, 66, 69. Compute the median of grouped data given that the class size is 10 (8 Marks).
4. Determine the variance of the following set of data; 9, 8, 6,5,8,6. (8 Marks)
5. Use the datasets below to answer the questions that follow;
 - a) Determine the range of the following set of data; 4,8,1,6,6,2,9,3,6,9. (2 Marks)
 - b) When do we use range? (2 Marks).
 - c) Determine the semi-interquartile range for the following set of data and state why it is used; 2,4,6,8,10,12,14,20,30,60. (4 Marks).

SECTION B: LONG ANSWER QUESTIONS (30 Marks)
CHOOSE ANY TWO QUESTIONS IN THIS SECTION

1. The data above for 10 individuals who were subjected to a diet to see if it altered their weights.

Person	wt. Before	wt. After
1	150	156.5
2	155	156.3
3	158	159.6
4	160	161.4
5	163	164.5
6	167	166.8
7	175	176.3
8	180	181.5
9	185	186.1
10	191	192.6

 - a) Formulate a null hypothesis (2Marks)
 - b) Assuming that the data is normally distributed, test the null hypothesis (13 Marks).
2. A study is run to evaluate the effectiveness of an exercise program in reducing systolic blood pressure in patients with pre-hypertension (defined as a systolic blood pressure between 120-139 mmHg or a diastolic blood pressure between 80-89 mmHg). A total of 15 patients with pre-hypertension enrol in the study, and their systolic blood pressures are measured. Each patient then participates in an

exercise training program where they learn proper techniques and execution of a series of exercises. Patients are instructed to do the exercise program 3 times per week for 6 weeks. After 6 weeks, systolic blood pressures are again measured. The data are shown below.

Patient	Systolic Blood Pressure Before Exercise Program	Systolic Blood Pressure After Exercise Program
1	125	118
2	132	134
3	138	130
4	120	124
5	125	105
6	127	130
7	136	130
8	139	132
9	131	123
10	132	128
11	135	126
12	136	140
13	128	135
14	127	126
15	130	132

Is there is a difference in systolic blood pressures after participating in the exercise program as compared to before? Assumption is that data is not normally distributed. (15 Marks).

3. A study compared St. John's Wort (SJW), Sertraline, and placebo in patients with major depressive disorder. Patients were assigned at random to one of the three treatments and were classified as having any response or no response. The contingency table is given below.

Trt \ Outcome	Any Response	No Response	Total
SJW	43	70	113
Sertraline	53	56	109
Placebo	50	66	116
Total	146	192	338

Give the expected count for Any Response among SJW patients under the hypothesis of no association between response and treatment, test this hypothesis at $\alpha = 0.05$. (15 Marks)

