



MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATION

2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER

**SCHOOL OF SCIENCE AND INFORMATION
SCIENCES**

MASTER OF SCIENCE (APPLIED STATISTICS)

COURSE CODE: STA 8107

COURSE TITLE: MALTIVARIATE METHODS I

DATE: 1/2/2024

TIME: 1430-1630 HRS

INSTRUCTIONS TO CANDIDATES

- i. Question **ONE** is compulsory
- ii. Answer any other **TWO** questions

QUESTION 1(20MARKS)

- a). State the properties of Σ (5marks)
- b). Let $\tilde{U} = (u_1, u_2, \dots, u_n)$ denote a n-dimensional vector of random variable . Find its expected value and its covariance (5marks)
- c). State with illustration **FIVE** properties of the multivariate normal distribution (10marks)

QUESTION 2 (20MARKS)

- a). Let $Z = (z_1, z_2, \dots, z_n)' \sim N(O, T_n)$. Define the quadratic form $q = z'A_2$ (4marks)
- b). State and explain **FIVE** approaches to imputing missing values (10marks)
- c). State and explain **THREE** major types of missingness data (6marks)

QUESTION 3 (20MARKS)

- a). If A is $m \times n$ and B is $s \times t$, Kronecker product of A and B. Find its matrix and state its properties. (10marks)
- b). When is a symmetric matrix A is said to be positive semidefinite (10marks)

QUESTION 4 (20MARKS)

- a). Suppose that one has a p-dimensional vector given by $X = (x_1, x_2, \dots, x_p)$ that has covariance matrix Σ . Find q-dimensional vector $Y = (y_1, y_2, \dots, y_q)$ (10marks)
- b). State and explain **FIVE** properties of Eigenvalues-Eigenvectors (10marks)

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