The Management University of Africa

Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF EDUCATION ARTS

GEO 224: QUANTITATIVE GEOGRAPHY

DATE: 9TH APRIL 2026

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided**

QUESTION ONE

Read the Case Study below carefully and answer the questions that follow:

Quantitative geography is a subfield and methodological approach to geography that develops, tests, and uses scientific, mathematical, and statistical methods to analyze and model geographic phenomena and patterns.

It aims to explain and predict the distribution and dynamics of human and physical geography through the collection and analysis of quantifiable data. The approach quantitative geographers take is generally in line with the scientific method, where a falsifiable hypothesis is generated, and then tested through observational studies.

This has received criticism, and in recent years, quantitative geography has moved to include systematic model creation and understanding the limits of their models. This approach is used to study a wide range of topics, including population demographics, urbanization, environmental patterns, and the spatial distribution of economic activity. The methods of quantitative geography are often contrasted by those employed by qualitative geography, which is more focused on observing and recording characteristics of geographic place. However, there is increasing interest in using combinations of both qualitative and quantitative methods through mixed-methods research to better understand and contextualize geographic phenomena.

Quantitative geography emerged in the mid-20th century as a response to the increasing demand for more systematic, empirical, and data-driven approaches to studying geographic phenomena.[6] It is a direct product of the quantitative revolution in geography. It was influenced by developments in statistics, mathematics, computer science, and the physical sciences. Quantitative geographers sought to use mathematical and statistical methods to better understand patterns, relationships, and processes in the spatial distribution of human and physical phenomena.

Computers perhaps had the most profound impact on quantitative geography, with techniques such as map analysis, regression analysis, and spatial statistics to investigate various geographic questions. In the 1950s and 1960s, advances in computer technology facilitated the application of quantitative methods in geography, leading to new techniques such as geographic information

systems (GIS). Notable early pioneers in GIS are Roger Tomlinson and Waldo Tobler. Simultaneously, new data sources, such as remote sensing and GPS, were incorporated into geographic research. These tools enabled geographers to collect, analyze, and visualize large amounts of spatial data in new ways, further advancing the field of quantitative geography.

In the late 20th century, quantitative geography became a central discipline within geography, and its influence was felt in fields such as urban, economic, and environmental geography. Within academia, groups such as the Royal Geographical Society Study Group in Quantitative Methods focused on spreading these methods to students and the public through publications such as the Concepts and Techniques in Modern Geography series. Economics and spatial econometrics both served as a driving force and area of application for quantitative geography.

The application of statistical and mathematical techniques, theorems and proofs in understanding geographical systems is known as the 'quantitative revolution' in geography. Statistical methods were first introduced into geography in the early 1950s (Burton, 1963). Consisting mainly of descriptive statistics, there was also some attempt at hypotheses testing using, for example, chi-square. Bivariate Regression Analysis followed shortly but it was not until the 1960s that the General Linear Model was fully explored. It was I. Burton who published a research paper, 'The Quantitative Revolution and Theoretical Geography' in the Canadian Geographer (7: pp.151-62) in 1963. The statistical methods are employed in geography for the generating and testing hypotheses using empirical data, whereas the mathematical techniques and theorems are used for deriving models from a set of initial abstract assumptions.

Today, research in quantitative geography continues, focusing on using innovative quantitative methods and technologies to address complex geographic questions and problems. The main objectives of the quantitative revolution in geography were as under: 1.To change the descriptive character of the subject (geo + graphy) and to make it a scientific discipline; 2.To explain and interpret the spatial patterns of geographical phenomena in a rational, objective and cogent manner; 3.To use mathematical language instead of the language of literature, like 'After in the

Koppen's classification of climate which stands for the 'tropical rainforests'; 4.To make precise statements (generalizations) about locational order; 5.To test hypotheses and formulate models, theories and laws for estimations and predictions; 6.To identify the ideal locations for the various economic activities so that the profit may be maximized by the resource users; and 7.To provide geography a sound philosophical and theoretical base, and to make its methodology objective and scientific.

Required:-

a) Distinguish between null and alternative hypothesis. **(4 marks)**

b)

Student number	1	2	3	4	5	6	7	8	9	10
Score before remedial	39	50	55	40	20	35	30	25	30	40
Score after remedial	45	55	60	65	50	60	39	55	60	55

c) i) State the null hypothesis for the data above. **(3 marks)**

ii) Determine whether the scores are significantly different at 0.05 level of significance. **(8 marks)**

iii) Comment about the results. **(5 marks)**

d) Examine the significance of quantitative techniques in geographic studies. **(5 marks)**

QUESTION TWO

a) Using **five** points, evaluate the process of hypothesis testing. **(10 marks)**

b) Briefly explore **five** sources of geographic data. **(5 marks)**

QUESTION THREE

a) Compare and contrast between qualitative and quantitative techniques in geography. **(5 marks)**

b) Using five examples, evaluate the scales of measurement as used in geographic analysis. **(10 marks)**

QUESTION FOUR

a) Using **five** examples, examine the role of chi-square in geographic analysis**.** **(10 marks)**

b) Examine **five** strengths of interview method as a method of data collection. **(5 marks)**

QUESTION FIVE

a) Analyze the need for sampling in research work. **(5 marks)**

b) A researcher obtained the following data on students' performance in a Geography exam.

50,55,61,73,8428,42

Compute the

i. Range **(2 marks)**

ii. Mean. **(2 marks)**

iii. Variance. **(3 marks)**

iv. Standard deviation. **(3 marks)**

QUESTION SIX

a) Distinguish between bi-variant and multi-variant. **(5 marks)**

b) Analyze **five** ways in which statistics can be abused **(10 marks)**