UNIVERSITY OF FORT HARE

GLG323

Economic Geology, Statistics and Data Analysis

November Examination: 2018

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Duration of examination: 3 hours

Subject: GLG323

Marks: 100

This paper consists of 4 pages including the cover page

Internal Examiners

Prof O Gwavava
Prof K Liu

External Examiner

Dr S Misra

INSTRUCTIONS

This paper has two sections. Answer two questions from each section.

SECTION A: STATISTICS AND DATA ANALYSIS

Question One [25]

(a) List and explain four *measures of location* of statistical measurements. [8]

(b) The trace length of fractures (in cm) in a rock exposure were measured and these are shown below:

10, 13, 10, 15, 9, 18, 21, 24, 21, 10, 21, 6

Calculate the following statistical parameters:

i. the mean, mode and median of the marks; [9]

ii. the standard deviation to two decimal places. [8]

Question Two [25]

(a) Some experiment is normally distributed with a mean of 78 and a standard deviation of 11. What are the minimum and maximum values (a,b) around the mean such that the following percentage of observations given below fall between these values? [6]

i. 68%

ii. 95%

iii. 99.7%

(b) A coin is tossed four times. Find the probability of getting exactly two heads by

i. listing the sample space using a tree diagram, [6]

ii. using the probability distribution given by:

$$P[X = r] = {}_{n}C_{r}\, p^{r}\, q^{(n-r)},$$

where ${}_{n}C_{r} = \dfrac{n!}{r!(n-r)!}$. [6]

(c) Hence using the information in (b), sketch a bar graph of the probability versus the number of heads for the four tosses of the coin. [7]

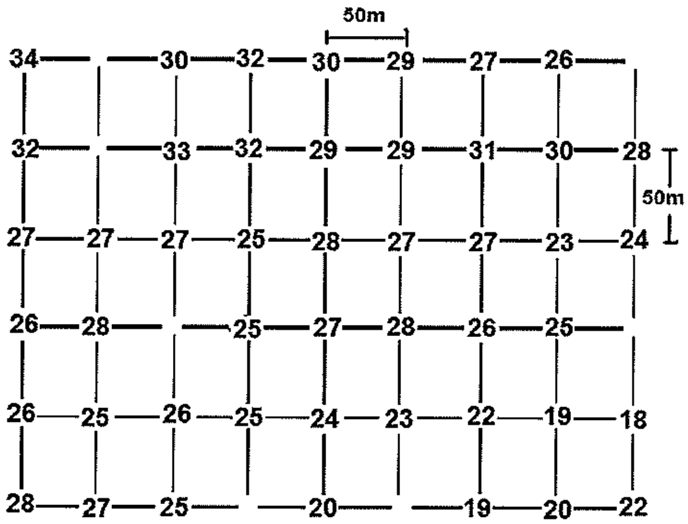
Question Three [25]

(a) What is *linear regression* and what are the *four principal assumptions* made? [6]

(b) Draw a well, labelled sketch of an experimental semi-variogram that attains the sill. Explain the variation of the semi-variogram. [6]

(c) The diagram below shows values of Cu weight percent data on a sampling grid at a copper mine. The distance between the sample pairs is 50 m. The experimental semi-variogram (γ^*) is given by:

$$\gamma^*(h) = \frac{1}{2n}\sum[g(x) - g(x+h)]^2 .$$



i. Identify all the pairs at 150 m apart in an east-west direction. [6]

ii. Calculate the experimental semi-variogram in the east-west direction at 150 m. [7]

SECTION B: ECONOMIC GEOLOGY

Question Four [25]

Define and explain the following terminologies of exploration and mining geology, with the aid of drawings/diagrams if necessary:

A. block sampling	(5)	B. open pit	(4)
C. adit	(4)	D. trench	(4)
E. shaft	(4)	F. stope	(4)

Question Five [25]

Write a concise essay, with the aid of drawings/diagrams, on the underground mining methods of:

(1) open stoping with support, (8)
(2) long-wall stoping, and (8)
(3) shrinkage stoping. (9)

Question Six [25]

How do you design the interval distance between exploration projects? Write an essay on how to determine reasonable interval distance between exploration projects.

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