UNIVERSITY OF FORT HARE

GLG323

Economic Geology,
Statistics and Data Analysis

January/February Supplementary Examination: 2019

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Duration of examination: 3 hours

Subject: **GLG323**

Marks: **100**

This paper consists of 4 pages including the cover page

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INSTRUCTIONS

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

SECTION A: STATISTICS AND DATA ANALYSIS

Question One [25]

(a) Explain the following statistical terms:

i. descriptive statistics. [2]

ii. inferential statistics. [2]

iii. mode and median. [2]

iv. interquartile range. [2]

(b) Rock samples for a particular rock type were collected at ten different locations and their densities determined. The density values (in g/cm3) are shown below:

2.62 2.43 2.55 2.88 2.64 2.77 2.72 2.68 2.58 2.73

Calculate the standard error in the mean of the rock density to two decimal places. Show your working. [11]

(c) Use the density data given in 1(b) to work out the 36% percentile. [6]

Question Two [25]

(a) What is a *normal distribution*? Sketch the curves for a normal distribution with a large and a small standard deviation respectively. What are the characteristics of a *standard normal distribution*? [10]

(b) James scores 840 in a national test. The mean test score was 750 with a standard deviation of 100. What proportion of learners had a higher score than James? Assume that the test scores are normally distributed and that the normal distribution can be converted to a Z-score given by:

$$Z = \frac{X - u}{\sigma}.$$ [7]

(c) In a coin-flipping experiment, what is the probability of obtaining:

i. two tails in a row? (Show your calculation). [4]

ii. three heads in a row? (Show your calculation). [4]

Question Three [25]

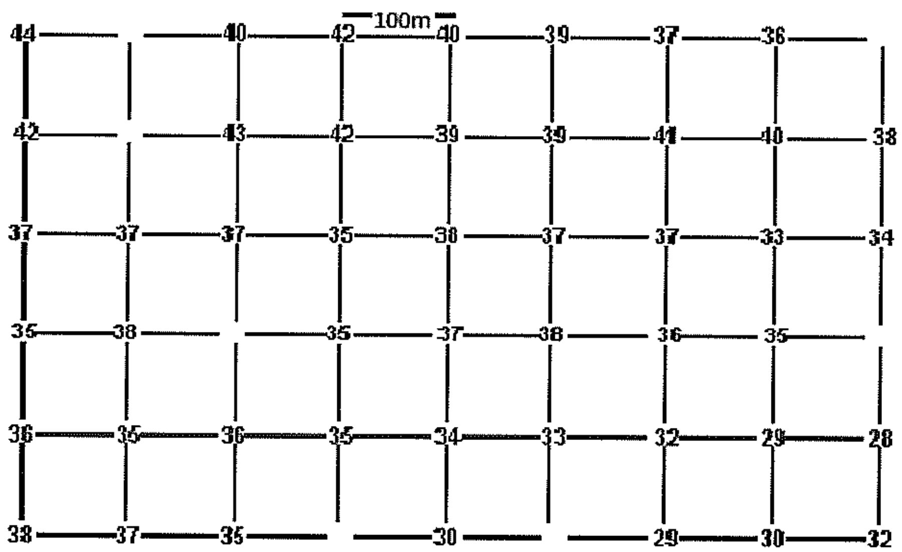
(a) i. What is *spatial data*? [2]

ii. Indicate on separate diagrams the following possible patterns of data points on a map: *regularly spaced, randomly spaced* and *grouped in clusters.* [3]

iii. What is special about spatial data? [7]

(a) The diagram below shows Fe weight percent data on a sampling grid at an iron mine. The distance between the sample pairs is 100 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 200 m apart in the north-south direction. [6]

ii. Calculate the experimental semi-variogram in the north-south direction at 200 m.

[7]

SECTION B: ECONOMIC GEOLOGY

Question Four [25]

With the aid of drawings/diagrams, write an essay on the geological exploration methods; emphases should be given to the criteria for ore recognition.

Question Five [25]

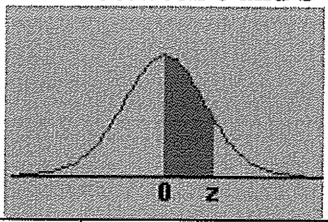
Write a concise essay, with the aid of drawings/diagrams, on the underground mining methods of open-stoping without support, cut and fill stoping, and block caving; and explain what condition is suitable to use each method.

Question Six [25]

Many geological factors could affect the requirement of interval distance between exploration projects. Write an essay on the factors that control/affect interval distance between exploration projects.

Standard Normal Distribution Table

Area between 0 and z



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

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