



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING ECONOMICS II

**DATE: 02 May 2017
(Tuesday)**

**TOTAL MARKS: 100
TO PASS: 50**

**TIME ALLOWED: 3 HOURS
(12h30 to 15h30)**

NOTE:

- This question paper consists of **FIVE** pages including this cover page.
- All questions must be answered.
- All answers and sketches to be presented in a neat and decipherable manner. Papers will not be marked if not decipherable.
- Restrict the use of highlighters.
- Do not use a red pen.
- Read the instructions on the front page of your answer book carefully.
- No cellular phones shall be allowed in the examination venue.
- The use of computers, laptops and palmtops is prohibited.

Question 1:

a) Explain with the aid of sketches what is meant by the following terms:

- i) Negative correlation (3)
- ii) Positive correlation (3)
- iii) No correlation (3)

b) Explain with the aid of sketches and diagrams the difference between Classical Statistics and Spatial Statistics (Geostatistics).

(7)

c) Briefly describe with the aid of sketches the following types of Variogram models.

- i) Nugget model (3)
- ii) Exponential model (3)

d) Explain with the help of annotated sketches the differences between a normal, positively and negatively skewed distribution.

(6)

[28 Marks]

Question 2:

The results from a sampling exercise carried out on a Cassiterite deposit are as follows:

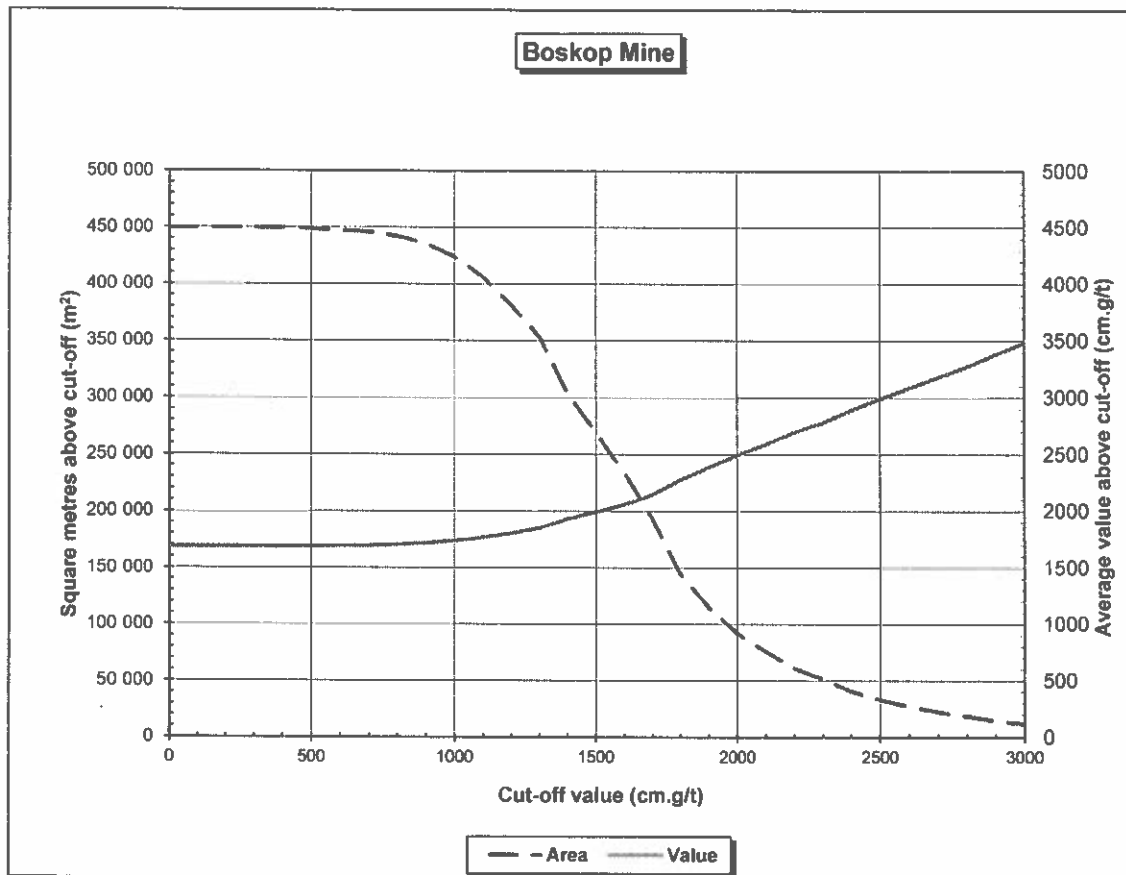
- a) The ore body follows a two parameter lognormal pattern
- b) Number of samples = 500
- c) The standard deviation for a sample is 1 lb./ton
- d) The mean of the $\ln(x)$ values is 3.5 lb./ton

Calculate:

- a) The mean value of the ore body
- b) The 95% upper and lower limit for the estimate

[12 Marks]

Question 3:



Determine **graphically** the following from the above Value Area Curve:

- a) The mean value of the deposit
- b) The total reef m² in the deposit

If the pay limit/breakeven value of the mine is 1 500 cm.g/t and a margin of 33.3 % is added what will the following answers be?

- c) My new required mining value to achieve a margin of 33.3 %
- d) The amount of reef m² available to be mined to achieve the 33.3% profit margin
- e) Based on the signature of the ore body what will the minimum value of any part of the resource have to be to still contribute to the desired profit margin?

[14 Marks]

Question 4

The following values are available for a block of ground on a gold mine.

Upper sampling value (cm.g/t)	Cumulative frequency (%)
4	5
7	6
12	8
29	12
46	18
80	25
120	35
180	50
280	68
450	82
800	93
1200	98
∞	100

- Determine, by means of a graph, whether the distribution is a normal or a log normal distribution.
- Determine, by means of a graph, whether this is a two or a three parameter distribution.
- Determine the parameters of the distribution from the graphs.

[30 Marks]

Question 5

The following table shows the sampling results of two variables. It is decided that only variable X, will be sampled in future:

X	Y
3.8	5.8
4.8	4.7
6.2	8.4
8.2	9.2
8.3	9.6
9.4	10.1
11.5	11.2
18.6	14.2
19.2	17.8

Calculate:

- a) The mean value for each variable
- b) The standard deviations (both for a sample and population) for each variable
- c) The correlation coefficient
- d) The regression line y on x

Explain:

- a) The significance of r^2 in terms of the total variation in y as explained by the linear relationship between x and y
- b) The type of correlation between the two variables

[16 Marks]

Total Marks [100]