



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

MINE SURVEYOR'S CERTIFICATE OF COMPETENCY EXAMINATION

MINING ECONOMICS II

DATE: Tuesday 12 April 2016

TOTAL MARKS: 100
TO PASS: 50

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

NOTE:

- This question paper consists of **FOUR** 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) Which factors need to be considered when deciding whether an estimate is either a Lognormal or a Sichel t estimate? (2)
- b) Which factors need to be considered when deciding whether an estimate is either a 2 or a 3 parameter Log Normal estimate? (4)

- c) Explain what is meant by the following geostatistical terms:
 - i) Anisotropy (2)
 - ii) Block Kriging (2)
 - iii) Covariance (2)
 - iv) Cross Validation (2)
 - v) Discretization (2)
 - vi) Search Neighborhood (2)

- d) Explain with the help of annotated sketches the difference between Classical Statistics and Geostatistics. (8)

- b) Explain with the help of annotated sketches the differences between a normal, positively and negatively skewed distribution. (6)

[32 Marks]

Question 2:

The following values, in grams per ton, were obtained from an underground reef raise which was recently sampled.

13, 26, 15, 24, 34, 17, 20, 27, 26, 29.

Calculate:

- a) The mean.
- b) The mode.
- c) The median.
- d) The standard deviation for a sample.
- e) The standard deviation for the population.
- f) The sample variance.
- g) The population variance.
- h) The population standard deviation mean.
- i) The population standard deviation mean if samples have a mass of 5kg and 30kg of ore is sent to the plant.

[18 Marks]

Question 3:

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

- a) The ore body follows a two parameter lognormal pattern
- b) Number of samples = 350
- c) The standard deviation for a sample is 1 g/t
- d) The mean of the $\ln(x)$ values is 3.6 g/t

Calculate:

- a) The mean value of the ore body
- b) The 80% upper and lower limit for the estimate

[18 Marks]

Question 4:

The drilling results from an opencast gold mining operation are as follows:

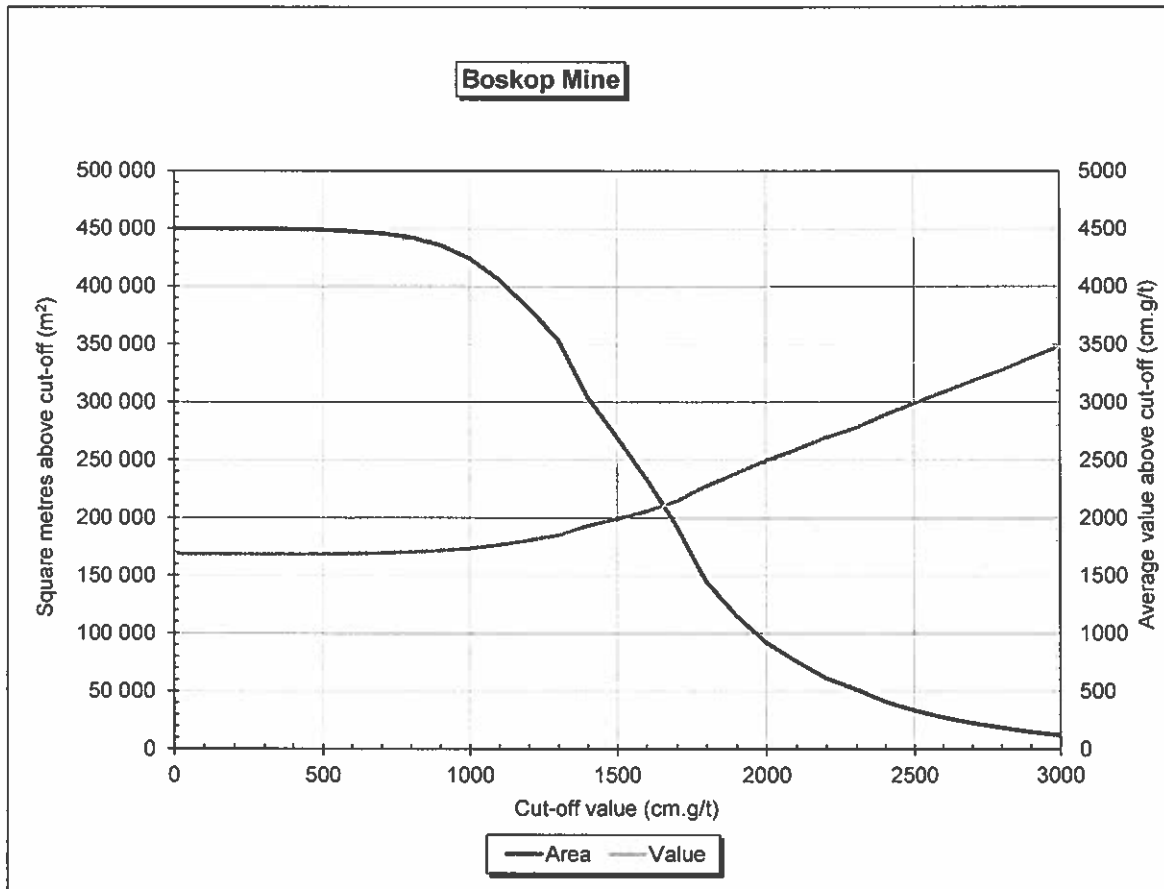
- a) Number of samples = 27
- b) The mean of the $\ln(x)$ values is 3.96 g/t
- c) $V=0.4391$

Calculate:

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

[18 Marks]

Question 5:



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]

Total Marks [100]