



**COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE**

**NMMS101: MATHEMATICS FOR BUSINESS 1**

**END OF FIRST SEMESTER EXAMINATIONS**

**NOVEMBER 2021**

**LECTURER: TARAMBAWAMWE P**

**DURATION: 5 HOURS**

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***INSTRUCTIONS***

Answer question 1 and any other question from this paper

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Credit will be awarded for logical, systematic and neat presentations

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You should answer 2 questions

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Q1(Compulsory)

- a. Briefly discuss, using examples, Exponential and logarithmic graphs showing the intercepts on the x and y axis and the turning points[ **6 marks**].
- b. i. What are the requirements for a relation to be a function? [ **2 marks**]  
ii. The spread of a carrot fly through an untreated crop is modeled by the relation  $Y = 500(1 - e^{-0.5t})$ , where  $Y$  is the weight of infected carrots in tons,  $t$  is time in days. State whether  $Y = 500(1 - e^{-0.5t})$  is a function, explain. [ **5 marks**].
- c. An accountant has estimated that the weekly costs of production  $C$  is given by  $C = 50 + 3x$ . Where  $x$  is the number of tones produced. The weekly revenue equation  $R = 100x - x^2$  ( $x < 100$ )  
i) Sketch the graphs of the cost and revenue functions on the same axes. ( not on graph paper) [ **7 marks**]  
ii) Recommend a level of  $x$  (indicate on your graph) which it would be rational to produce and justify your answer [ **5 marks**]

Q2 a.

Solve

- i.  $\log_2 Y = 9/(\log_2 Y)$  [ **4 marks**]  
ii.  $8 - 10r < 8 + 4r$  or  $-6 + 8r < 2 + 8r$  [ **3 marks**]  
iii.  $2(x-5) + 7x = 9(x-3) + 17$  [ **3 marks**]

b.

- i Every \$1 invested in a saving scheme gets interest at the rate of 6% per annum so that the total value of \$1 investment after  $t$  years years( $y$ ) is  $Y = 1.06^t$   
Find in how many years does the value of investment double. [ **5 marks**]
- .ii Cbplg works in Mutare and makes \$39 per hour. She works in an office and must get her suit dry cleaned every day for \$83. If she wants to make more than \$268 a day, at least how many hours must she work? [ **4 marks**]
- iii. In a netball tournament a team will pay \$150 to use a playground for a day and \$55 per hour for game officials. The team have \$100 and can expect an additional donation of \$250 from some sponsors. How many hours can the netball team afford to pay for the playground and officials? [ **6 marks**]

Q3

a. i.

$$\text{Let } A = \begin{pmatrix} 1 & 0 & -3 & 2 \\ 0 & 3 & 1 & -5 \\ 2 & 4 & 0 & 3 \\ -3 & 1 & -1 & 2 \end{pmatrix} \quad \text{if } B = \begin{pmatrix} 1 & 2 \\ 3 & -1 \\ 0 & -2 \\ 4 & 1 \end{pmatrix} \quad \text{and } C = \begin{pmatrix} 3 & -2 & 0 & 5 \\ 1 & 0 & -3 & 4 \end{pmatrix}$$

Find BCA

[3 marks]

$$\text{ii. Given } B = \begin{pmatrix} 2 & -2x+3 & 1 \\ 1 & 2 & -1 \\ -4 & 2-3x & 2 \end{pmatrix} \quad \text{Find } x \text{ if } \det(B) = -6$$

[3marks]

- b. A travelling retailer has two markets: Mutare and Harare. The number of items sold w is given in the following table

Items sold	Pencils	Rulers	Calculators
Mutare	25	27	75
Harare	47	24	6

The profit per for each good in each market was

Profit per item	Mutare	Harare
Pencil	\$0.12	\$0.40
Ruler	\$0.15	\$0.35
Caculator	\$6	\$3.00

Using matrix multiplication calculate

- The profit made in each market.
- The profit made on each class of good.

[5 marks].

[ 5 marks].

C, Eva had a bake sale to earn extra money. On the first day, she earned \$12.50 selling 10 cookies and 4 brownies. On the second day, she earned \$15.50 selling 6 brownies and 8 pieces of pie. On the third day, she earned \$12.00 selling 16 cookies. If Eva sold 12 cookies and 2 pieces of pie the next day, how much did she make? [ 9 marks].

**End of Examination Paper**