



“Investing in Africa’s Future”

FACULTY OF MANAGEMENT AND ADMINISTRATION

COURSE TITLE: MMS 101: MATHEMATICS FOR BUSINESS I

SEMESTER 2: FINAL EXAMINATION NOV-DEC 2014

LECTURER: Mr. Agrippah KANDIERO

TIME: 3 HOURS

INSTRUCTIONS

Answer **questions as instructed in each section.**

Total possible mark is **100.**

Start **each section B** question on a new page in your answer booklet.

The marks allocated to **each** question are shown at the end of the section.

Show all your workings.

Credit will be awarded for logical, systematic and neat presentations.

SECTION A – ANSWER ALL QUESTIONS

A.1

(a) Solve the equations

(i) $\ln(x - 2) = 0.5$ [5]

(ii) $5e^{-0.4t} = 40$ [5]

(b) The spread of a carrot fly through an untreated crop is modelled by the Equation $Y = 500(1 - e^{-0.5t})$, where Y is the weight of infected carrots in tons,

t is time in days

- Graph Y and label values $t = 0, 2, 4$ and 6 [5]
- Calculate the time taken to infect 1000 tons of carrots [5]

A.2

Plot and compare the graphs of the following functions,[6]

(i) $y = 0.6x^2$ (ii) $y = x^2$ (iii) $y = 2x^2$

Comment on the relative rate of change of the three graphs [4]

A.3 The demand and supply functions for a good are given by the equations

$P = 88 - 2Q$ and $P = 24 + 4Q$ respectively.

- Calculate the equilibrium price and quantity [3]
- Plot the function [5]

A.4 Calculate the APR for a 8% nominal rate of interest which is compounded

- 5 times per year [3]
- continuously [2]

PART 2 - ANSWER TWO QUESTIONS

Question 1: Financial mathematics [20 marks]

1.1 If £1000 is invested at a 9% nominal rate of interest, determine,

- the value of the investment after 20 years when interest is compounded continuously.
- How many years will it take for the value of the investment to reach £4000, when continuous compounding is used?
- What is the present value of £1000 which will be paid five years from now, if interest of 9% is compounded continuously?

1.2 If £950 is invested at 7.5%

- simple interest
 - compound interest, compounded continuously
- calculate

- the value of the investment at the end of each year for the first 5 years
- the number of years that the investment should be left on deposit if it is to

double in value

Question 2: Quadratic functions [20 marks]

2.1 Given the function: $y = 5x^2 - 20x + 36$ find the solution algebraically and plot the function. [10]

2.2 A firm has a total cost function and demand function given by the equations

$$TC = 10 + 4Q \quad \text{and} \quad P = 20 - 2Q, \text{ respectively.}$$

(a) Write down the equations for total revenue and profit

(b) Calculate the values of Q for which

(i) profit is maximized

(ii) total revenue is maximized.

Question 3: Straight line mathematics and applications [20 marks]

I. For each of the following equations:

(a) $y = 4x + 10$ (b) $P = 16 - 6Q$

Graph each line.

Deduce the equation of the translated line obtained by shifting the original line

(i) two units vertically upwards

(ii) one unit vertically down

(iii) three units forward along the horizontal axis

(iv) two units backwards along the horizontal axis

Graph the translated lines on the same diagram as the original line.

II. Write down the equation for variable cost and total cost (assume a linear total cost function) when the fixed cost of a product is £24 800 while each unit produced costs £200. Hence write down the equation of the new total cost function

(a) if a once-off subsidy of £2 000 is given

(b) fixed costs increases by 20% (assume the subsidy still applies)

(c) Plot the functions to show the changes

BOA SORTE