"Investing in Africa's Future"

COLLEGE OF BUSINESS PEACE LEADERSHIP AND GOVERNANCE

NMMS 101: MATHEMATICS FOR BUSINESS 1

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER 2022

LECTURER: Mr. Timothy Makambwa

DURATION: 3 HOURS

INSTRUCTIONS

Answer **ALL** the questions in Section A and **any** Three questions from Section B and each question has **20** ma

Start **each** question on a new page on your answer sheet.

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

Section A (40 Marks)

1. $x = 2x - (6 - x)$ [3]
2. $\frac{6y}{7} = \frac{-3}{5}$ [3]
3. $1.5(4x - 3) = 2\,[x - (4x - 3)]$ [4]
4. $\frac{x}{2} = \frac{x - 3}{x - 5}$ [5]
5. $3x + y = 9$ and $5x - y = 7$. Find the value of x and y [3]

6. Find the equation of the line with y-intercept 4 and slope – 2/3 [3]
7. Determine an equation of the vertical line that passes through the point (3, -6). [4]
8. Find the slope-intercept form of the line that passes through (2,-3) and (-4, 7). [4]
9. Suppose f is a linear function with slope 5 and such that $f(1) = 4$. Find $f(x)$. [5]
10. Suppose that a manufacturer will place 1000 units of a product on the market when the price is \$10 per unit, and 1400 units when the price is \$12 per unit. Find the supply equation for the product assuming the price p and quantity q are linearly related [6]

Section B

Answer any ***three*** questions in this Section

11. Simple and Compound Interest

a) Susan deposits \$2000 into her savings account. What is her balance after she earns 7% simple interest for 6 years? [3]
b) Find the total amount in your account if you start with \$750 at 7.5% interest for 2.5 years [3]
c) How much should you invest at 7% to have \$200 after 5 years? [4]
d) You deposit \$1200 into an account that earns 3.8% interest compounded annually. Find the balance after 5 years. [5]
e) Max borrows \$3500 for a new car. The loan has 6.7% interest that will be compounded annually. How much money will he owe after 36 months? [5]

12. Demand, Total Revenue and Maximisation

a) A pet food company needs to calculate how much to charge for a bag of rabbit food that costs \$10 to produce. The fixed costs involved in production are \$15,000. They want to start making a profit after they have sold 4,000 bags of rabbit food. What is the least amount they can charge to make this goal?
b) Suppose that a manufacturer will place 1000 units of a product on the market when the price is \$10 per unit, and 1400 units when the price is \$12 per unit. Find the supply equation for the product assuming the price p and quantity q are linearly related. [5]
c) Suppose the cost to produce 100 units of a product is \$5000, and the cost to produce 125 units is \$6000. If cost c is linearly related to output q, find an equation relating c and q. [5]
d) The demand per week for a new automobile is 400 units when the price is \$16,700 each and 500 units when the price is \$14,900 each. Find the demand equation for the cars, assuming that it is linear. [5]
e) The demand function for an appliance company's line of washing machines is $p = 300 - 5q$, where p is the price (in dollars) per unit when q units are demanded (per week) by consumers. Find the level of production that will maximize the manufacturer's total revenue, and determine this revenue. [5]

13. Logarithmic and exponential functions

a) :Given that log 2 ≈ 0.3010, log 3 ≈ 0.4771, and log 5 ≈ 0.6990, use the laws of logarithms to find :

i. log 12
[2]

ii. log 2.5
[2]

iii. log 75
[2]

iv. log 243
[2]

b) Use the properties of logarithms to solve the equation for x:

$$\log_3(x+1) - \log_3(x-1) = 1$$

[6]

c) Solve the equation: $2e^{x+2} = 5$.
[6]

14. Equations

a) Solve the following system algebraically: 3x - 4y = 18 [3]
2x + 5y = -11

b) $6x^2 + 7x = 3$ [3]

c) Solve: $-3x^2 + 5x = 1$ by using the Quadratic formula. [6]

d) A number is 3 greater than another number. The product of the numbers is 28. Write an equation to represent this and hence find two sets of numbers that satisfy this problem. [8]

15. Arithmetic and Geometric series

a) The 35th term of an A. P. is 69. Find the sum of its 69 terms.

b) The first term of an A. P. is 10, the last term is 50. If the sum of all the terms is 480, find the common difference and the number of terms.

c) Find the sum of the G. P.: 1, 3, 9, 27, … up to the 10th term.

d) Find the sum of the G. P.:1/√3;1,√3,….81

[20]

END OF PAPER

Mathematics Formulae

Annually compounded interest formula:

$$\text{Amount} = P\left(1 + \frac{R}{100}\right)^n$$

A= final amount

P = initial principal balance

R = annual interest rate

n= time (in years)

Simple Interest

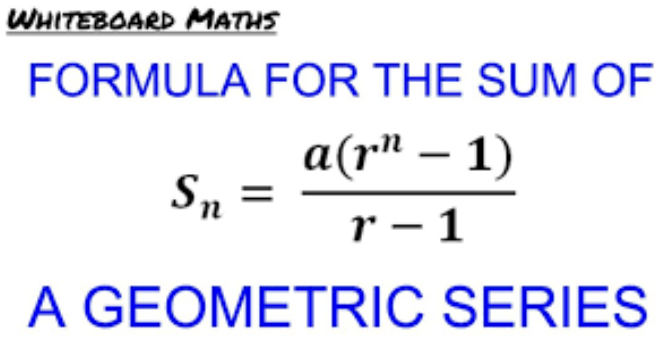
: A = P(1 + Rt)

A= final amount

P = initial principal balance

R = annual interest rate

t= time (in years



Formula for Arithmetic Series

$$S_n = n\left(\frac{a_1 + a_n}{2}\right)$$

$$= n\left(\frac{a_1 + a_1 + (n-1)d}{2}\right)$$

$$= n\left(\frac{2a_1 + (n-1)d}{2}\right)$$

$$S_n = \frac{n}{2}\left[2a_1 + (n-1)d\right]$$

Solve an equation of the form **ax2+bx+c=0** by using the quadratic formula: $x = (-b + \sqrt{(b^2 - 4ac)}/\mathbf{2a}$

$x = (-b - \sqrt{(b^2 - 4ac)}/\mathbf{2a}$