COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NMMS105: MATHEMATICS FOR BUSINESS 2

END OF SECOND SEMESTER EXAMINATIONS

APRIL 2022

LECTURER: TARAMBAWAMWE P

DURATION: 3 HOURS

INSTRUCTIONS

Answer Question 1(Compulsory) and any other question

Credit will be awarded for logical, systematic and neat presentations

Question One

a. Solve the following system of linear equations using the Gauss Jordan method [8 marks]

$$\begin{cases} w-5x+2y-z=-18 \\ 3w+x-3y+2z=17 \\ 4w-2x+y-z=-1 \\ -2w+3x-y+4z=11 \end{cases}.$$

b.i. Determine the following. $\int\left(x-2x^2+\frac{1}{3x}\right)dx$ [5 marks]

c) find dy/dx for $y = 4e^{-x}(\ln x)$ [3 marks]

d.The chain rule states that dy/dx =(dy/dt)(dt/dx). Use the chain rule to

dy/dx in terms of t for

$x = 4-2t \qquad y = 3+6t-4t^2$ [4 marks]

Question Two

i. Solve $\frac{dy}{dx}=\frac{x^2+1}{x+1}$. [5 marks]

ii.

$x\frac{dy}{dx}-2y=x^4\,e^{x^2}$ [5 marks]

iii) Solve the differential equation $y^1= 12e^{0.6t}$, given y=80 when t=0 [6 marks]

iv) . The population of fish in a pond is modelled by the differential equation
0.25(dP/dt) = 120-P
where time t is measured in years. Towards what number does the population of fish tend? If there are initially 10 fish in the pond, how long does it take for the number of fish to reach 90% of the eventual population? [14 marks]

Question Three

a. Find the general and particular solutions of the following and determine the general path of each solution

i. $\mathbf{Y_{t+1}} = 14Y_t - 28$, given $Y_0 = 20$ [7 marks]

ii. $\mathbf{P_{t+1}} = 0.85P_t + 5(2)^t$, given $P_0 = 2000$ [8 marks]

b. The population of Zimbabwe is 15 million. The birth rate is 45 per year and the death rate is 3% per year. There are 50000 people who get into Zimbabwe every year from other countries.

i. Form a difference equation [5 marks]

ii. Solve the difference equation and then estimate the population in 20 years.

[10 marks]

END OF EXAMINATION……