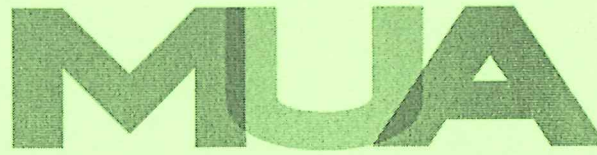**The Management University of Africa**

Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF ARTS EDUCATION

MTH 121 : CALCULUS 1 -DIFFERENTIAL

DATE: 8TH APRIL 2022

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. **Write all your answers in the Examination answer booklet provided.**

QUESTION ONE

a) The side of a cube increases by 5%. Find the corresponding percentage increase in the volume. **(7marks)**

b) Evaluate $\lim_{x\to-2}(x^2 - 1)$ **(6marks)**

c) Find $\frac{dy}{dx}(2x^2 cos3x)$ **(5marks)**

d) Differentiate from the first principle

$$F(x)=2x^3+3$$ **(7marks)**

QUESTION TWO

a) Find the equation of the tangent to the curve y $=x^3$-2x+1 at (-1,2) **(6marks)**

b) A particle projected from a fixed point with velocity 10ms^{-1} moves in a straight line such that its velocity after a time t seconds is v=bt^2+7t+c where b and c are constants. One second after projection its acceleration is 1m/s. find the value of b and c **(9marks)**

QUESTION THREE

a) Differentiate from the first principles $f_{(x)} = 2x^2 + 3x^2$ **(6marks)**

b) Find the stationary points of $y = \frac{1}{3}x^3 - 2x^2 + 3x$ and identify their nature.

(9marks)

QUESTION FOUR

a) Differentiate with respect to x

  a. y = (x-3)(x^2+7x-1) **(4marks)**

b) Use the chain rule to differentiate $\frac{1}{(1-5x)^2}$ **(5marks)**

c) Give that x^2-3xy+2y^2-2x=4. Find the value of $\frac{dy}{dx}$ at the point (1-1) **(6marks)**

QUESTION FIVE

a) Find $\frac{dy}{dx}$ $y = (2x^2 - 1)(x^2 + 3)$ (7marks)

b) If f(x) = $x^3 + x^2 - 5x - 5$ find the integral on which f is increasing and the interval on which f is increasing.   (8marks)

QUESTION SIX

100cm of fencing is to be used to make a rectangular enclosure. Find the greatest possible area of the enclosure.   (15marks)