

The
Management
University
of Africa



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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF EDUCATION (SOE)

DEGREE OF BACHELOR OF EDUCATION ARTS

SPECIAL/SUPPLEMENTARY EXAM

MTH 443: NUMERICAL ANALYSIS

DATE: 6TH AUGUST 2026

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 true value of π is 3.14159265..... In some mensuration problems the value $\frac{22}{7}$ is commonly used as an approximation to π .

Compute the relative error in this approximation

(5marks)

- b) Convert $P(x) = -8x^3 + 7x - 8x^4 + 2x^5 - x^2 + 3$ to nested form and evaluate $P(5)$

(7marks)

- c) Construct a difference table for $f(x) = x^3 + 2x + 1$ for $x = 1, 2, 3, 4, 5$

(6marks)

- d) Estimate $\int_0^3 (x^3 - 6x) dx$ using the Trapezoid Rule and 6 equally spaced intervals

(7marks)

QUESTION TWO

- a) Suppose $X = \frac{5}{7}$, $y = \frac{1}{3}$ and that five-digit chopping is used for arithmetic calculations involving x and y .

Compute the percentage error involved in $\frac{x}{y}$

(6

marks)

- b) Use Lagrange interpolation Formula to evaluate $f(9)$ given the data below

x	5	7	11	13
f(x)	150	392	1452	2366

**(9
marks)**

QUESTION THREE

- a) Form a difference table and interpolate the value of $f(x)$ when $x = 4$ using Newtons Forward Formula given the table below

X	3	5	7	9
f(x)	180	150	120	90

**(7
marks)**

- b) The following is a table of values of a polynomial of degree 5. It is given that $f(3)$ is in the error. Correct the error

(8 marks)

X	0	1	2	3	4	5	6
Y	1	2	33	254	1054	3126	7777

QUESTION FOUR

- a) Find the first three derivatives of the function at $x = 1.5$ from the table below

x	1.5	2.0	2.5	3.0	3.5	4.0
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y	3.375	7.0	13.625	24.0	38.875	59.0
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(9**marks)**

- b) Using Central difference formula for derivatives and the data below, find $f'(6.0)$ and $f''(6.3)$,
error $\theta (h^2)$

x	6.0	6.1	6.2	6.3	6.4
f(x)	0.1750	- 0.1998	- 0.2223	- 0.2422	- 0.2596

(6**marks)****QUESTION FIVE**

- a) A particle moves along a straight line so that at time t its distance S from a fixed point of the line is given by $\frac{ds}{dt} = t(\sqrt{8-t^3})$. Use the Simpsons Rule with 8 strips to calculate the approximate distance travelled by the particle from $t=0$ to $t=2$

(7marks)

- b) Using the trapezoidal rule approximate the value of $\int_0^1 x \log(x+1) dx$
using 9 ordinates

(8 marks)**QUESTION SIX**

- a) Find the root of $x^3 - 2x^2 + 3x - 5 = 0$ using Regula Falsi method correct to 3 decimal places

(8**marks)**

b) Find the root of the equation $x^3 - x - 1$ using Newton Raphson

(7marks)