



Republic of Rwanda
City of Kigali



DISTRICT COMPREHENSIVE ASSESSMENT, RTQF LEVEL 4 NET

TRADE: NETWORKING

MODULE CODE AND TITLE: GENAM 401: BASIC ANALYSIS

DATE OF EXAM:/03/2023

Duration: 3hrs

ACADEMIC YEAR: 2022-2023

Instructions:

The paper is composed of three (3) main Sections as follows:

Section A:

Section B:

Section C:

Show ALL working clearly.

Calculators and mathematical instruments are allowed.

MAXIMUM MARKS: 100 Marks

SECTION A

1. Solve the following simultaneous equations, /5marks

$$\begin{cases} 3x + 5y = 42 \\ 2y - x - 8 = 0 \end{cases}$$

2. Given the function $f(k) = k^2 + 8k + 16$. Find the values k . /5marks

3. Given $f(x) = \frac{5x}{x+1}$

- a. find $f(2)$ / 4marks
- b. find $(1/)$ /4marks

4. Solve graphically a quadratic equation /10marks

a. $f(x) = x^2 - 2x - 3$

b. $x^2 - 4x + 3 > 0$

5. Determine the domain of each of the following numerical functions: /20Marks

a. $f(x) = \frac{x+1}{2x-4}$

b)

$$f(x) = \sqrt{x^2 - 3x - 10}$$

c)

$$f(x) = \sqrt{\frac{-x^2 - 2x + 3}{9 - x^2}}$$

SECTION B

6.

Find the ranges of the following functions:

a. $f(x) = 3 - 2x$ /3marks

b. $f(x) = x^2 - 2$ /3marks

7.

Determine whether f is odd or even in each of the following cases:

a. $f(x) = 2x^2 + 1$

2marks

8.

Find all the asymptotes of the function: /15 Marks

$$f(x) = \frac{x^2 - x - 2}{x + 2}$$

9. Find the differentiation (derivative) of: /10marks

a. $f(x) = 3x^2 + 2x - 1$ at $x=1$

b. $f(x) = x^2 - 5x + 3$ and evaluate $f'(0), f'(1)$

c. $f(x) = \frac{\sin x}{\cos x}$

d. $f(x) = \frac{x + 2x^3}{3x}$

e. $f(x) = \sqrt[3]{2x + 3}$

SECTION C

10. Find the limit of the following: 10marks

a.

$$\lim_{x \rightarrow \infty} \frac{x + 1}{x^2 + 3x + 1}$$

b.

$$\lim_{x \rightarrow +\infty} (x - \sqrt{x^2 + 4x - 1})$$

c.

$$\lim_{x \rightarrow \infty} \sqrt{\frac{2x^3 - 5x^2 + 4x - 6}{6x^3 + 2x}}$$

d. $\lim_{x \rightarrow \infty} 100$

11. For a given function $f(x) = x^4 - 6x^2 + 8$ find /10marks

(Use $\sqrt{2}=1.4$)

- Domain of function
- The symmetry
- Limits using the Df
- Asymptotes
- 1st derivative (show where the function is increasing and decreasing and and find the local extrema)
- 2nd derivative (show where the function is concave up and concave down and and find the inflection points)
- Variation table
- Other points
- Sketch the curve

