SIR ARTHUR LEWIS COMMUNITY COLLEGE
ACADEMIC YEAR (2024/2025) – SEMESTER TWO
END OF SEMESTER EXAMINATION

COURSE CODE	**:**	**MAT143**
COURSE TITLE	**:**	College Trigonometry
LECTURER(S)	**:**	Allison Drysdale-Felix,
		Antonia Laurent-Goodman
		Petrus Jn. Francois
DATE	**:**	**April 30, 2025**
TIME	**:**	**9 a.m.**
DURATION	**:**	**2 hours**
STUDENT ID #	**:**	_____

GENERAL INFORMATION AND INSTRUCTIONS

- Students must sign **IN** and **OUT** on the examination class list.
- Write your ID number on the question paper.
- There are five (5) pages with seven (7) questions.
- Answer all questions in the spaces provided in BLUE or BLACK ink.
- Non programmable calculators are permitted.

FORMULAS

Quadratic formula for $ax^2 + bx + c = 0$ is given as

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometric identities

$$\frac{\sin x}{\cos x} \equiv \tan x$$

$$sin^2 x + cos^2 x \equiv 1$$

Question	Student's mark	Moderated Score	Max Score
1			6
2			5
3			5
4			8
5			7
6			7
7			7
TOTAL			**45**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Candidate ID_____

Instruction: Answer all questions in the spaces provided in BLUE or BLACK ink.

1. (a) Find the roots of the equation $z^2 - 2z + 6 = 0$, giving your answers in the form $a \pm i\sqrt{b}$, where a and b are integers. [4]

(b) Show these roots on an Argand Diagram [2]

2. z_1 and z_2 are the complex numbers $4 + 2i$ and $3 - i$ respectively. Find

a) $2z_1 - z_2$ [2]

b) $z_1 z_2$ [3]

3. Given that $z = \frac{5 - 12i}{3 + 4i}$, place z in the form $x + iy$ where $x, y \epsilon R$, stating clearly the value of x and y [5]

4. (a) Find the modulus and argument for the complex number $-1 + 3i$, giving answers to 3 decimal places. [4]

(b) Hence, write $-1 + 3i$ in polar form. [1]

c) Use de Moivre's theorem to find $(-1 + 3i)^4$ [3]

5. (a) Write $5i^{21} - 9i^{96} + 2i^{105}$ in a simplified form [4]

(b) Given that $z_1 = 2 + 3i$ and $z_2 = 2x - yi$, find the value of x and y for which $z_1 = z_2$ [3]

6. (a) Show that the equation $3\sin^2 x + 7\sin x = \cos^2 x - 4$ can be written in the form $4\sin^2 x + 7\sin x + 3 = 0$ [2]

(b) Hence solve, for $-360° \leq x \leq 360°$,
$3\sin^2 x + 7\sin x = \cos^2 x - 4$ [5]

7.

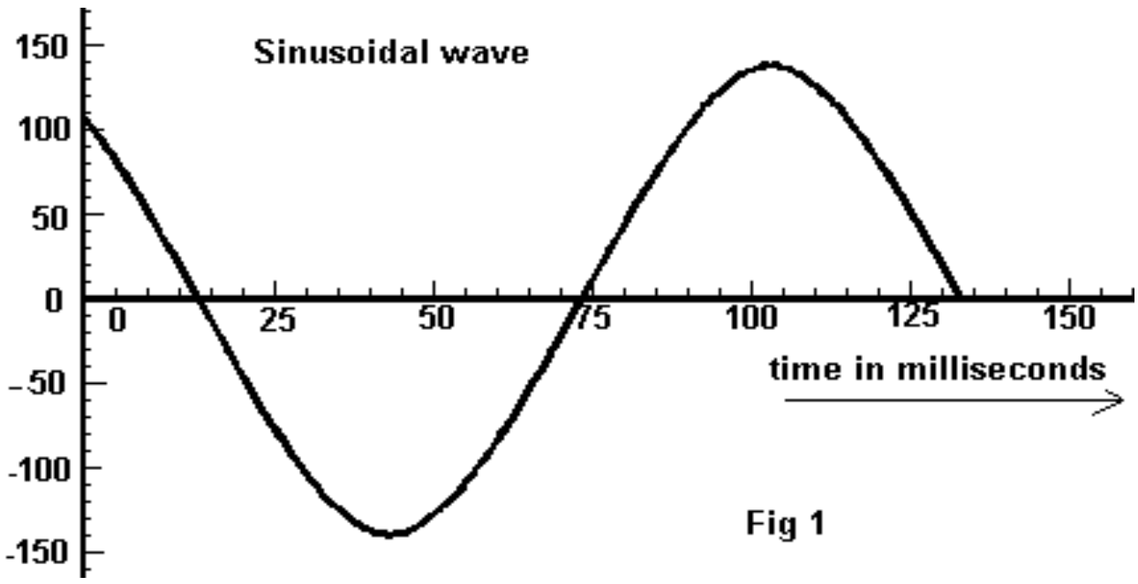

Fig 1

The figure shown above shows a sinusoidal wave drawn to scale. From the graph determine the following.

i. The amplitude of the wave.
ii. The period of the wave.
iii. The frequency of the wave.
iv. The phase angle of the wave and its direction - lead or lag.
v. Hence, determine the equation of the wave.

[7]

END OF EXAMINATION