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Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

Complete, fold and seal
(see note 2 below)

SURNAME:

Yareb

FORENAME(S):

Alkalim

1	Student Number	AIK25882786
2	Title of Examination Paper	MATHEMATICS TEST 2
3	Module Code	GOEN4001
4	Date and Time of Examination	19/05/2025
5	Examination Venue	Typhoon Main hall
6	Seat Number	B3
7	Number of Answer Books handed in	1

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

Rk

$$\begin{aligned}\cos &= \sin \\ \sin &= \cos \\ -\cos &= -\sin \\ -\sin &= \cos\end{aligned}$$

$$c^{ax} \rightarrow \frac{c^{ax}}{a}$$

i. $\int (25x^4 + 12x^2 + 6x - 10) dx$

$$\frac{25x^5}{5} + \frac{12x^3}{3} + \frac{6x^2}{2} - 10x + C = \underline{\underline{4}}$$

ii. $\int (\sin 7x + 6\cos 3x + 5e^{5x}) dx$

$$-\frac{1}{7}\cos 7x + 2\cos 3x + e^{5x} + C = \underline{\underline{2}}$$

$$6\cos 3x \rightarrow 6 \times \frac{1}{3} \cos 3x$$

$$\hookrightarrow \frac{6}{3} \cos 3x \rightarrow 2\cos 3x \checkmark$$

$$5e^{5x} \rightarrow \frac{5e^{5x}}{5} \rightarrow e^{5x} \checkmark$$

v. $\int_1^5 (2x^3 + 5x^2 + 3x - 9) dx$

$$\left[\frac{2x^4}{4} + \frac{5x^3}{3} + \frac{3x^2}{2} - 9x \right]_1^5 = \underline{\underline{4}}$$

$$\left[\frac{2(5)^4}{4} + \frac{5(5)^3}{3} + \frac{3(5)^2}{2} - 9(5) \right] - \left[\frac{2(1)^4}{4} + \frac{5(1)^3}{3} + \frac{3(1)^2}{2} - 9(1) \right]$$

$$\hookrightarrow \left[\frac{1540}{3} \right] - \left[-\frac{16}{3} \right] = \frac{1556}{3} \Rightarrow 518.667$$

vi. $\int_0^4 (2e^{2x} + \sin \frac{x}{2}) dx$

$$e^{2x} + -\cos$$

$$\sin 2$$

$$\hookrightarrow -\frac{1}{2} \cos(2)$$

$$\left[e^{2x} - \frac{1}{2} \cos\left(\frac{x}{2}\right) \right]_0^4$$

$$\hookrightarrow$$

$$\sin \frac{x}{2} \rightarrow -\frac{1}{2} \cos\left(\frac{x}{2}\right)$$

$$\left[e^{2(4)} - \frac{1}{2} \cos\left(\frac{4}{2}\right) \right] - [0] \checkmark$$

$$\left[e^{2(4)} - \frac{1}{2} \cos\left(\frac{4}{2}\right) \right] - \left[-\frac{1}{2} \right] = 2979.958$$

Question two

$$z_1 = 3+4j, z_2 = 5+3j, z_3 = 2+6j$$

i $z_1 + z_2$

$$3+4j + 5+3j = 8+7j$$

ii ~~$2z_2$~~ $2z_2 + 3z_3$

$$2(5+3j) + 3(2+6j)$$

$$10+6j + 6+18j \rightarrow 16+24j$$

iii $z_1^2 + z_3$

$$(3+4j)^2 + 2+6j$$

$$(3+4j)(3+4j)$$

$$9+12j+12j+16 = 9+24j+16$$

iv $z_1 \cdot z_2 \cdot z_3$

$$(3+4j)(5+3j)(2+6j)$$

$$(15+9j+20j+12)(2+6j)$$

$$(15+29j+12)(2+6j)$$

$$30+90j+58j+174+24+72j$$

$$204 + 148j$$

v. $\frac{z_1}{z_2}$

$$\frac{3+4j}{2+6j}$$

$$\frac{7}{8} \Rightarrow 0.875$$

Q27/34Q2a5/18

a)

iv. AB

$$\begin{bmatrix} 2 & 0 & 3 \\ 1 & 8 & 3 \\ 0 & 2 & 0 \end{bmatrix} \times \begin{bmatrix} 3 & 0 & 2 \\ 2 & 5 & 0 \\ 1 & 3 & 6 \end{bmatrix}$$

$$\begin{cases} 2 \times 3 + 0 \times 2 + 3 \times 1 & 2 \times 0 + 0 \times 5 + 3 \times 3 = 9 \\ 1 \times 3 + 8 \times 2 + 3 \times 2 & 1 \times 0 + 8 \times 5 + 3 \times 3 = 49 \\ 0 \times 3 + 2 \times 2 + 0 \times 1 & 0 \times 0 + 2 \times 5 + 0 \times 3 = 10 \end{cases}$$

$$\begin{cases} 2 \times 2 + 0 \times 0 + 3 \times 6 = 22 \\ 1 \times 2 + 0 \times 8 + 3 \times 6 = 20 \\ 0 \times 2 + 2 \times 0 + 0 \times 6 = 0 \end{cases}$$

$$\begin{bmatrix} 9 & 9 & 22 \\ 25 & 49 & 20 \\ 10 & 10 & 0 \end{bmatrix}$$

3

v. Bc

$$\begin{bmatrix} 3 & 0 & 2 \\ 2 & 5 & 0 \\ 1 & 3 & 6 \end{bmatrix} \begin{bmatrix} 1 & 4 \\ 2 & -5 \\ 3 & 1 \end{bmatrix}$$

$$3 \times 1 + 0 \times 2 + 2 \times 3 = 9$$

$$3 \times 4 + 0 \times -5 + 2 \times 1 = 15$$

$$2 \times 1 + 2 \times 5 + 0 \times 3 = 12$$

$$2 \times 4 + 5 \times -5 + 0 \times 1 = -17$$

$$1 \times 1 + 3 \times 2 + 6 \times 3 = 25$$

$$1 \times 4 + 3 \times -5 + 6 \times 1 = -5$$

$$\begin{bmatrix} 9 & 15 \\ 12 & -17 \\ 25 & -5 \end{bmatrix}$$

2

vii. not possible

1

Q17/34Q1a7/16Q1b0/10Q1c0/8

Question two

b)

$$5x^2 - 8x + 5 = 0$$

$$a = 5 \quad \checkmark$$

$$b = -8 \quad \checkmark$$

$$c = 5 \quad \checkmark$$

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

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4 \times 5 \times 5}}{2 \times 5} \quad \checkmark \quad \underline{\underline{=}}$$

$$\frac{0.8 \pm \sqrt{82}}{5} \quad \times$$

$$\frac{8 \pm \sqrt{-64}}{105} \quad \times$$

$$0.8 \pm \sqrt{16.4} \quad \times$$

$$0.8 \pm 16.4j$$

$$x_1 = 0.8 + 16.4j \quad \text{E.C.F.}$$

$$x_2 = 0.8 - 16.4j \quad \underline{\underline{=}}$$

Q2b2/9Q2c0/7

$$\int 5x e^{5x}$$

	0	1
+	$5x$	e^{5x}
-	5	$\frac{e^{5x}}{5}$
+	$\bullet$	$\frac{e^{5x}}{25}$
-	5	$\frac{e^{5x}}{125}$

$$\frac{e^{5x}}{5} + \frac{1}{5}$$

$$5x$$

Q3c

018

$$5x + \frac{e^{5x}}{5} - 5 \frac{e^{5x}}{25} + \frac{e^{5x}}{125} + C$$

$$5x + \frac{e^{5x}}{5} - 5 \frac{e^{5x}}{25} + C$$

X 0

$$u = 5x$$

$$v = e^{5x}$$

Question One

The Determinant of A

$$\begin{bmatrix} 2 & 0 & 3 \\ 1 & 8 & 3 \\ 9 & 2 & 0 \end{bmatrix}$$

$$\rightarrow 2 \begin{vmatrix} 8 & 3 \\ 2 & 0 \end{vmatrix} - 0 \begin{vmatrix} 1 & 3 \\ 9 & 0 \end{vmatrix} + 3 \begin{vmatrix} 1 & 8 \\ 9 & 2 \end{vmatrix} = ??$$

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