



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.

1	Student Number	1707686/1
2	Title of Examination Paper	Maths Tes 2
3	Module Code	GOAC006
4	Date and Time of Examination	11/5/18 PM
5	Examination Venue	Main Hall Gower College
6	Seat Number	10
7	Number of Answer Books handed in	

Complete, fold and seal
(see note 2 below)

SURNAME: Taylor

FORENAME(S): Matthew

List the numbers of the questions you have attempted	Office Use
3	
1	
Q1	
a	18
b	4
c	0
d	4
Q3	
a	6
b	9
c	7
d	1
e	1
f	0
Total	50/80

Test 2



62.5%

Question

$$3. a) i) (5+3j) + (2-7j)$$

$$5+2+3j-7j$$

$$= 7-4j \quad \checkmark \quad \textcircled{1}$$

$$ii) (5+3j) - (2-7j)$$

$$5-2+3j+7j$$

$$= 3+10j \quad \checkmark \quad \textcircled{1}$$

$$iii) \frac{(5+3j)}{(2-7j)} \times \frac{(2+7j)}{(2+7j)} \quad \checkmark \quad \textcircled{1}$$

$$= \frac{10 + 35j + 6j + 21j^2}{4 + 14j - 14j - 49j^2} \quad \checkmark \quad \textcircled{1}$$

$$= \frac{10 + 21(-1) + 41j}{4 - 49(-1)}$$

$$= \frac{-11 + 41j}{53} = -\frac{11}{53} + \frac{41j}{53} \quad \checkmark \quad \textcircled{1}$$

$$iv) (5+3j)(5+3j) \times (2-7j) \quad \checkmark$$

$$25 + 15j + 15j + 9j^2 \times (2-7j) \quad \checkmark \quad \textcircled{1}$$

$$9j^2 + 30j + 25(2-7j) \quad ?$$

Q3

6

3. b) $12x^2 + 7 = -5x$
 $12x^2 + 5x + 7 = 0$ ✓

$$\frac{-5 \pm \sqrt{5^2 - 4(12)(7)}}{2(12)} \quad \text{✓} \quad \textcircled{1}$$

$$= \frac{-5 \pm \sqrt{-311}}{24} \quad \text{✓} \quad \textcircled{1}$$

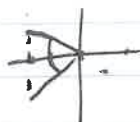
$$= -\frac{5}{24} \pm \frac{\sqrt{311} \sqrt{-1}}{24} \quad \text{✓} \quad \textcircled{1}$$

$$= -\frac{5}{24} \pm \frac{17.635j}{24} \quad \text{✓} \quad \textcircled{1}$$

$$r = \sqrt{\left(-\frac{5}{24}\right)^2 + \left(\frac{17.635}{24}\right)^2}$$

$$= 0.763 \quad 0.764 \quad \text{✓} \quad \textcircled{1}$$

$$\theta = \tan^{-1} \left(\frac{17.635}{24} \right) / \left(\frac{5}{24} \right)$$



$$\theta = \cancel{-74.171}^\circ$$

$$180 - 74.171 = 105.829^\circ \quad \text{✓} \quad \textcircled{1}$$

$$180 + 74.171 = 254.171^\circ \quad \text{✓} \quad \textcircled{1}$$

in polar

$$\frac{-5}{24} \pm \frac{17.635j}{24} = 0.764 \angle 105.829^\circ \quad \text{✓} \quad \textcircled{1}$$

or

$$= 0.764 \angle 254.171^\circ \quad \text{✓} \quad \textcircled{1}$$

c) i) $(5 + 7j)^6$

$$r = \sqrt{5^2 + 7^2}$$

$$= 8.602 \quad \text{✓} \quad \textcircled{1}$$

$$\theta = \tan^{-1} \frac{7}{5}$$

$$= 54.462^\circ \quad \text{✓} \quad \textcircled{1}$$

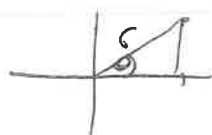
De Moivre's

$$8.602^6 \angle 6(54.462)$$

$$= 8.602^6 (\cos 6 \times 54.462 + j \sin 6 \times 54.462)$$

$$= 405132.076 (0.836 - j 0.548)$$

$$= 338696.4155 - j 222001.0657$$



~~$$(-222001.0657)$$~~

c) ii) $(-1 + 3j)^5$

$$r = \sqrt{(-1)^2 + 3^2}$$

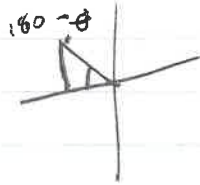
$$= 2\sqrt{2} \quad \times$$

$$\theta = \tan^{-1} \frac{3}{-1}$$

$$= -71.56^\circ$$

$$180 - 71.56$$

$$= 108.44 \quad \checkmark \textcircled{1}$$



2
✓

$$\times (2\sqrt{2})^5 (\cos 5 \times 108.44 + j \sin 5 \times 108.44) \quad \checkmark$$

$$181.02 (-0.99 - j 0.038) \quad \textcircled{1}$$

$$-179.21 - j 6.88$$

d) rectangular = ~~cartesian~~ cartesian $\checkmark \textcircled{1}$

cartesian
cartesian
cartesian
cartesian

1
✓

e) conjugate of $5 - 3j$ is $5 + 3j$ $\checkmark \textcircled{1}$

1
✓

f) $(2+3j)(3-6j)(-1+j)$

$$6 - 12j + 9 - 18j^2 \quad \times$$

10
✓

Q3

18

✓

Question
1.

$$\begin{aligned}
 \text{a) i) } & (3 \times 2) + (-2 \times 8) + (-3 \times -5) = 5 \quad \checkmark \\
 & (3 \times 1) + (-2 \times 7) + (-3 \times 0) = -11 \quad \checkmark \\
 & (3 \times 4) + (-2 \times 3) + (-3 \times 1) = 3 \quad \checkmark \\
 & (5 \times 2) + (4 \times 8) + (1 \times -5) = 37 \quad \checkmark \\
 & (5 \times 1) + (4 \times 7) + (1 \times 0) = 33 \quad \checkmark \\
 & (5 \times 4) + (4 \times 3) + (1 \times 1) = 33 \quad \checkmark \\
 & (2 \times 2) + (3 \times 8) + (4 \times -5) = 8 \quad \checkmark \\
 & (2 \times 1) + (3 \times 7) + (4 \times 0) = 23 \quad \checkmark \\
 & (2 \times 4) + (3 \times 3) + (4 \times 1) = 21 \quad \checkmark
 \end{aligned}$$

$$AB = \begin{bmatrix} 5 & -11 & 3 \\ 37 & 33 & 33 \\ 8 & 23 & 21 \end{bmatrix} \quad \checkmark \quad (5)$$

$$\begin{aligned}
 \text{ii) } & (2 \times 3) + (1 \times 5) + (4 \times 2) = 19 \quad \checkmark \\
 & (2 \times -2) + (1 \times 4) + (4 \times 3) = 14 \quad \times \\
 & (2 \times -3) + (1 \times 1) + (4 \times 4) = 11 \quad \checkmark \\
 & (8 \times 3) + (7 \times 5) + (3 \times 2) = 65 \quad \checkmark \\
 & (8 \times -2) + (7 \times 4) + (3 \times 3) = 21 \quad \checkmark \\
 & (8 \times -3) + (7 \times 1) + (3 \times 4) = -5 \quad \checkmark \\
 & (-5 \times 3) + (0 \times 5) + (1 \times 2) = -13 \quad \checkmark \\
 & (-5 \times -2) + (0 \times 4) + (1 \times 3) = 13 \quad \checkmark \\
 & (-5 \times -3) + (0 \times 1) + (1 \times 4) = 19 \quad \checkmark
 \end{aligned}$$

$$BA = \begin{bmatrix} 19 & 14 & 11 \\ 65 & 21 & -5 \\ -13 & 13 & 19 \end{bmatrix} \quad (4)$$

$$\begin{aligned}
 \text{iii) } & (3 \times 1) + (-2 \times 4) + (-3 \times 1) = -8 \\
 & (3 \times 2) + (-2 \times 2) + (-3 \times 3) = -7 \\
 & (5 \times 1) + (4 \times 4) + (1 \times 1) = 21 \\
 & (5 \times 2) + (4 \times 2) + (1 \times 3) = 21 \\
 & (2 \times 1) + (3 \times 4) + (4 \times 1) = 18 \\
 & (2 \times 2) + (3 \times 2) + (4 \times 3) = 22
 \end{aligned}$$

$$AC = \begin{bmatrix} -8 & -7 & 21 \\ 21 & 21 & 22 \\ 18 & 22 & 22 \end{bmatrix} \quad \checkmark \quad (3)$$

i v) 3×2 3×3

Not possible ✓

①

v) $|A| =$

3	-2	3
5	4	1
2	3	4

3	-2
5	4
2	3

$$(3 \times 4 \times 4) + (-2 \times 1 \times 2) + (-3 \times 5 \times 3) = -1$$

$$(2 \times 4 \times 3) + (3 \times 1 \times 3) + (4 \times 5 \times 2) = -55$$

$$|A| = -1 - (-55) = 54$$

②

vi)

2	1	4
8	7	3
-5	0	1

2	1
8	7
-5	0

$$(2 \times 7 \times 1) + (1 \times 3 \times -5) + (4 \times 8 \times 0) = -1$$

$$(-5 \times 7 \times 4) + (0 \times 3 \times 2) + (1 \times 8 \times 1) = -32$$

-132

$$|B| = -1 - (-32) = 30$$

x

vii) $\begin{bmatrix} 5 & -1 & 1 \\ 13 & 11 & 4 \\ -3 & 3 & 5 \end{bmatrix}$

①

viii) not possible

①

$$1. b) \begin{aligned} 3x + 2y &= 10 \quad \checkmark \\ 4x + 3y &= 13 \quad \checkmark \end{aligned} \quad \textcircled{1}$$

$$\begin{aligned} 9x + 6y &= 30 \quad \checkmark \\ \text{sub } 8x + 6y &= 26 \quad \checkmark \end{aligned} \quad \textcircled{1}$$

$$1x = 4$$

$$\underline{x = 4} \quad \checkmark \quad \textcircled{1}$$

$$3(4) + 2y = 10$$

$$\underline{12 + 2y = 10}$$

$$2y = 10 - 12$$

$$y = \frac{-2}{2}$$

$$\underline{y = -1} \quad \checkmark \quad \textcircled{1}$$

c)

$$d) \begin{bmatrix} 3 & 2 & -1 \\ 2 & -1 & 4 \\ 5 & -1 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 17 \\ -5 \\ 6 \end{bmatrix} \quad \textcircled{1}$$

$$D \begin{array}{ccc|ccc} 3 & 2 & -1 & 3 & 2 & \\ 2 & -1 & 4 & 2 & -1 & \\ 5 & -1 & -1 & 5 & -1 & \end{array}$$

$$(3 \times -1 \times -1) + (2 \times 4 \times 5) + (-1 \times 2 \times -1) = 45 \quad \checkmark$$

$$(5 \times -1 \times -1) + (-1 \times 4 \times 3) + (-1 \times 2 \times 2) = -11 \quad \checkmark$$

$$45 - (-11) = 56 \quad \checkmark$$

D₁

$$\begin{vmatrix} 17 & 2 & -1 & 17 & 2 \\ -5 & -1 & 4 & -5 & -1 \\ 6 & -1 & -1 & 6 & -1 \end{vmatrix}$$

$$(17 \times -1 \times -1) + (2 \times 4 \times 6) + (-1 \times -5 \times -1) = 60$$

$$(6 \times -1 \times -1) + (-1 \times 4 \times 17) + (-1 \times -5 \times 2) = -52$$

$$60 - (-52) = 112$$

4

D₂

$$\begin{vmatrix} 3 & 17 & -1 & 3 & 17 \\ 2 & -5 & 4 & 2 & -5 \\ 5 & 6 & -1 & 5 & 6 \end{vmatrix}$$

$$(3 \times -5 \times -1) + (17 \times 4 \times 5) + (-1 \times 2 \times 6) = 343$$

$$(5 \times -5 \times -1) + (6 \times 4 \times 3) + (-1 \times 2 \times 17) = 63$$

$$343 - 63 = 280$$

D₃

$$\begin{vmatrix} 3 & 2 & 17 & 3 & 2 \\ 2 & -1 & -5 & 2 & -1 \\ 5 & -1 & 6 & 5 & -1 \end{vmatrix}$$

$$(3 \times -1 \times 6) + (2 \times -5 \times 5) + (17 \times 2 \times -1) = -102$$

$$(5 \times -1 \times 17) + (-1 \times -5 \times 3) + (6 \times 2 \times 2) =$$

x

$$x = \frac{112}{56} \begin{vmatrix} 3 & 2 & -1 & 6 \\ 2 & -1 & 4 & 4 \\ 5 & -1 & -1 & 10 \end{vmatrix}$$

?