

88-192

MOURA

20A

12 Pages

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.**

[illegible]



①

a)

$$i) \boxed{z_1 + z_2}$$

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

$$11-j$$

2

$$ii) \boxed{z_1 - z_2}$$

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

$$-1+5j$$

2

$$iii) \boxed{z_1 z_2}$$

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

$$\boxed{j^2 = -1}$$

$$30 - 15j + 12j - 6j^2$$

$$30 - 3j - 6 \times (-1)$$

$$30 - 3j + 6$$

$$\boxed{36 - 3j}$$

3

$$b) \begin{pmatrix} a & b \\ 5 & 4 \end{pmatrix}^s$$

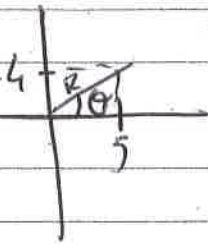
$$R^2 = a^2 + b^2 = R^2 = (5)^2 + (4)^2$$

$$R^2 = 25 + 16$$

$$R^2 = 41$$

$$R = \sqrt{41}$$

$$R = 6.4$$



$$\tan \theta = \frac{4}{5}$$

$$\theta = \tan^{-1}\left(\frac{4}{5}\right)$$

$$\theta = 38.66^\circ$$

$$\begin{aligned} \text{DMT} &\rightarrow R^m (\cos m\theta - j \sin m\theta) \\ &6.4^5 (\cos(5 \times 38.66) - j \sin(5 \times 38.66)) \\ &10737.42 (\cos 193.3 - j \sin 193.3) \\ &-10449.43 - 2470.14j \end{aligned}$$

4

② a) $\int 5u^3 - 2u^2 + 6 \, du =$

$$\frac{5u^4}{4} - \frac{2u^3}{3} + 6u + C$$

4

b) $\int \frac{1}{u^7} \, du =$

$$u^{-7} =$$

$$\frac{u^{-6}}{-6} + C$$

3

$$c) \int \cos 2u \, du = \frac{1}{2} \sin 2u + C \quad \checkmark$$

2

$$d) \int (u+7)^2 \, du =$$

$$(u+7)(u+7) =$$

$$u^2 + 7u + 7u + 49 =$$

$$u^2 + 14u + 49 =$$

$$\frac{u^3}{3} + \frac{14u^2}{2} + 49u + C \quad \checkmark$$

5

$$e) \int_0^2 u^3 - 2u + 1 \, du =$$

$$\left[\frac{u^4}{4} - \frac{2u^2}{2} + u \right]_0^2 - [0] =$$

$$\left[\frac{(2)^4}{4} - \frac{2 \times (2)^2}{2} + 2 \right] - [0] =$$

$$\left[\frac{16}{4} - \frac{8}{2} + 2 \right] - [0] = 4 - 4 + 2 = 2 \quad \checkmark$$

4

p) $\int_1^4 (u+6)(u+2) du$

$$u^2 + 2u + 6u + 12$$

$$u^2 + 8u + 12$$

$$\left[\frac{u^3}{3} + \frac{8u^2}{2} + 12u \right]_1^4 - \left[\frac{u^3}{3} + \frac{8u^2}{2} + 12u \right]_1^1 =$$

$$\left[\frac{(4)^3}{3} + \frac{8 \times (4)^2}{2} + 12 \times 4 \right] - \left[\frac{(1)^3}{3} + \frac{8 \times (1)^2}{2} + 12 \times 1 \right] =$$

$$\left[\frac{64}{3} + \frac{128}{2} + 48 \right] - \left[\frac{1}{3} + \frac{8}{2} + 12 \right] =$$

$$\left[21.33 + 64 + 48 \right] - \left[0.33 + 32 + 12 \right] =$$

$$133.33 - 44.33 =$$

$$= 89$$

4

③

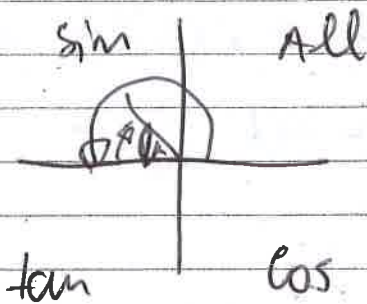
a)

$$\sin u = 0.53$$

$$u = \sin^{-1}(0.53)$$

$$u = 32^\circ$$

$$180 - 32 = 148^\circ$$



2

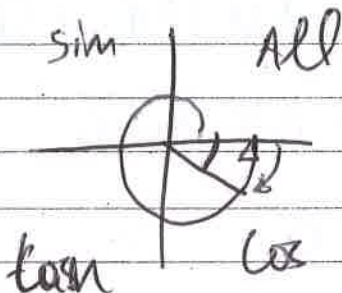
b)

$$\cos u = 0.11$$

$$u = \cos^{-1}(0.11)$$

$$u = 83.7^\circ$$

$$360 - 83.7 = 276.3^\circ$$



2

c)

$$\tan u = -0.73$$

$$u = \tan^{-1}(0.73)$$

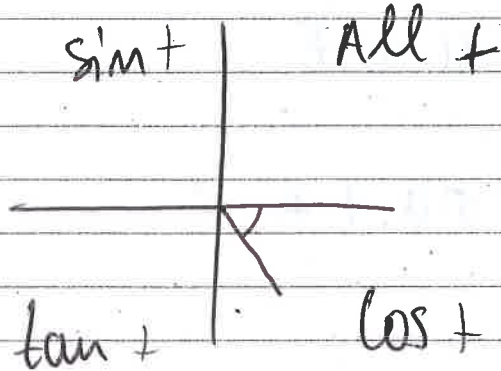
$$u = 36.13^\circ$$

$$270 + 36.13$$

$$306.13^\circ$$

$$360 - 36.13$$

$$323.87^\circ$$



2

④ a) $y = 6u^3 + u^2 + u^1 - 1$

$$\frac{dy}{du} = 3 \times 6u^2 + 2 \times 2u + 1u^0$$

$$\frac{dy}{du} = 18u^2 + 4u + 1$$

2

b) $y = (u+8)(u+7)$

$$u^2 + 7u + 8u + 56$$

$$\frac{dy}{du} = u^2 + 15u + 56$$

$$\frac{dy}{du} = 2u + 15$$

3

c) $y = 5u^2 + 7u + 5$

$$\frac{dy}{du} = 2 \times 5u + 7$$

$$\frac{dy}{du} = 10u + 7$$

2

d) $y = \sin 6u$

~~$$\frac{dy}{du} = \frac{1}{6} \cos 6u$$~~

$$\frac{dy}{du} = 6 \cos 6u$$

2

$$e) y = \frac{1}{u^3}$$

$$\frac{dy}{du} = u^{-3}$$

$$\frac{dy}{du} = -3u^{-4} \quad /$$

2

$$f) y = u^5 \sin u$$

$$\frac{du}{du} = 5u^4$$

$$\frac{dv}{du} = \cos u$$

$$\frac{dy}{du} = u^5 (\cos u) + \sin u (5u^4)$$

4

$$g) y = \frac{u^2 + 4u + 7}{\tan u}$$

$$\frac{dy}{du} = \frac{2u + 4}{\sec^2 u}$$

$$\frac{du}{du} = u^2 + 4u + 7$$

$$\frac{du}{du} = 2u + 4$$

$$\frac{dv}{du} = \tan u$$

$$\frac{dv}{du} = \sec^2 u \rightarrow$$

$$\frac{dy}{du} = \frac{\tan u (2u+4) - (u^2+4u+7)(\sec^2 u)}{(\tan u)^2}$$

4

$$h) y = (8u^2 + 2u - 1)^6$$

$$\begin{matrix} (2 \times 8u + 2u) \\ u \quad \checkmark \\ (16u + 2u) \end{matrix}^6$$

$$\frac{dy}{du} = (u + 2u)^6 \times (16u + 2u)^6$$

~~256~~

$$y = (8u^2 + 2u - 1)^6$$

$$6(8u^2 + 2)^5$$

$$6(16u + 2)^5 \times (u)$$

1



al 17.9%

FORENAME(S): Sean THOMAS

12 Pages

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	1704066
2	Title of Examination Paper	Analytical methods and study skills Case 2
3	Module Code	~~MA~~ MAx02193
4	Date and Time of Examination	01/05/2019
5	Examination Venue	IQ103
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1 (i)(ii)(iii)	
1(b)	
2(a)(e)(f)	
4(a)(b)	
Total	12/67

(Gweler yr ochr arall am y fersiwn Cymraeg)

1000

1000

1000

1000

1000

1000

1000

1000

1000

1000

1
10
i)

~~21+22~~ $z_1 + z_2$

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

$$11 - j + 16j$$

$$11 - j + 16j$$

$$11 + 15j$$

ii)

$z_1 - z_2$

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

X

iii)

$z_1 z_2$

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

$$30 + 6j - 6j - 6j$$

X

2

$$a) 5x^3 - 2x^2 + 6$$

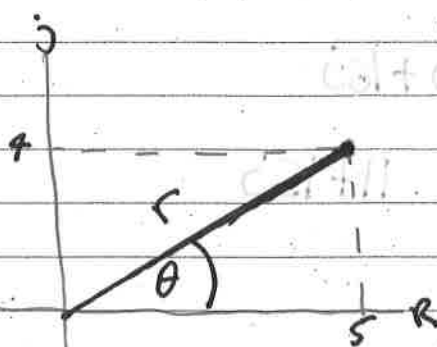
$$\left[\frac{5x^3}{4} - \frac{2x^2}{3} + 6 \right]$$

X

1

b) $(5 + 4j)^5$

$$r^n (\cos^n \theta + j \sin^n \theta)$$



$$r = \sqrt{4^2 + 5^2} = 6.40$$

$$\theta = \tan^{-1}\left(\frac{4}{5}\right) = 38.66^\circ$$

$$(6.40)^5 (\cos^5 38.66 + j \sin^5 38.66)$$

$$10737.42 (\cos 193.30 + j \sin 193.30)$$

$$10737.42 (\cos 193.30 + j \sin 193.30)$$

$$-10449.43 - 2470.19j$$

2

a) $\int 5x^3 - 2x^2 + 6 \, dx$

$$\left[\frac{5x^4}{4} - \frac{2x^3}{3} + 6x \right] + C$$

b)

c)

d)

e)

1
2
d)

e) $\int_0^2 x^3 - 2x + 1 dx$

$$\left[\frac{x^4}{4} - \frac{2x^2}{2} + 1 \right]_0^2$$

$$\left[\frac{(2)^4}{4} - \frac{2(2)^2}{2} + 1 \right] - (0) = 4 - 4 + 1 = 1 + C$$

f) $\int_1^4 (x+6)(x+2) dx$

~~x^2~~

$$x^2 + 8 + 6x + 2x$$

$$x^2 + 8x + 8$$

$$\left[\frac{x^3}{3} + \frac{8x^2}{2} + 8 \right]$$

$$\left[\frac{(4)^3}{3} + \frac{8(4)^2}{2} + 8 \right] - \left[\frac{(1)^3}{3} + \frac{8(1)^2}{2} + 8 \right]$$

$$93.3 - 12.3$$

$$81 + C$$

9

a) $y = 6x^3 + 2x^2 + x - 1$

$$6x^2 + 2x$$

4 b) $y = (x+8)(x+7)$

$y = (x+8)(x+7)$

$y = x^2 + 56 + 8x + 7x$
 $x^2 + 15x + 56$

$\left[\frac{x^2 + 15x + 56}{1} \right]$

X

1



12 Pages

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.**

59.7%

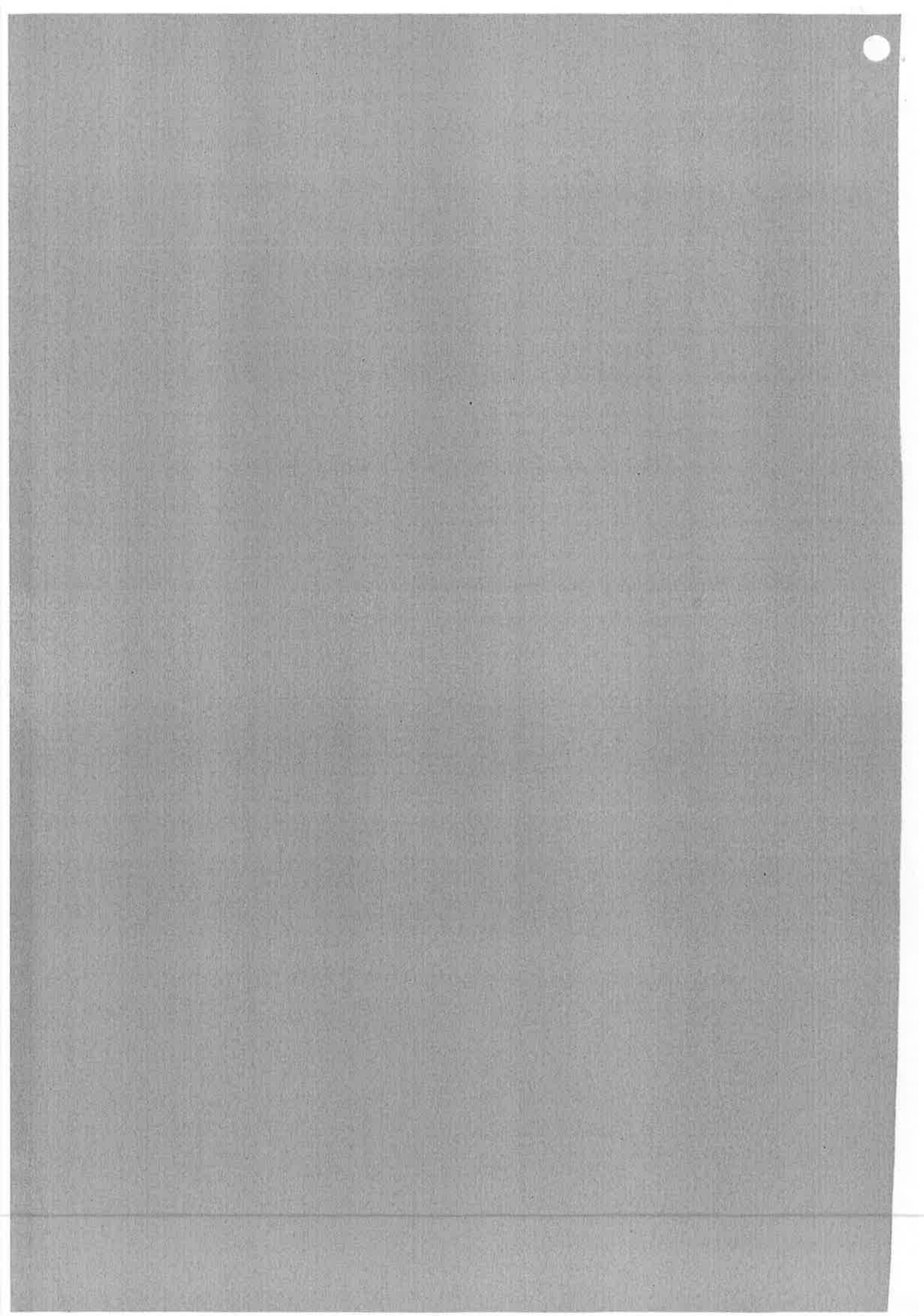
SURNAME: England

FORENAME(S): Garrett John

1	Student Number	1702839
2	Title of Examination Paper	Analysical methods
3	Module Code	M4x02193
4	Date and Time of Examination	wed 1 st may.
5	Examination Venue	1Q 103
6	Seat Number	
7	Number of Answer Books handed in	4

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)



Q1
a) $(5+2j) + (6-3j)$

$5+6+2j-3j$

$11+j$ ✓

$6+5+2j-3j$

2

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

$11+j$

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

$30 - 15j + 12j - 6j^2 \Rightarrow 30 - 21j$ ✓

b) $(5+4j)^5$

$r^2 = \sqrt{5^2 + 4^2}$

$r = \sqrt{41}$

$r = 6.4$ ✓

$\tan \theta = 6.4$

$\theta = \tan^{-1}(6.4)$

$= 81.12$ ✓

$(6.4)^5 (\cos(81.12) + j \sin(81.12))$

$(6.4)^5 (\cos 405.6 + j \sin 405.6)$

$(6.4)^5 (0.67 + j0.71)$

$$10737.42 - (0.7 + 10.71)$$

$$7516.2 + 17628.6$$

X

Q2.

a)

$$\int 5x^3 - 2x^2 + 6 \, dx$$

$$\int \frac{5x^4}{4} - \frac{2x^3}{3} + 6x + C$$

4

b)

$$\int \frac{1}{x^7} \, dx$$

$$\int x^{-7}$$

$$\frac{x^{-8}}{-8} + C$$

X

c)

$$\int \cos 2x \, dx$$

$$\frac{1}{2} \sin 2x + C$$

2

d)

$$\int (x+7)^2 \, dx \Rightarrow \int (x+7)(x+7)$$

$$\int x^2 + 2x + 7x + 49 \, dx \Rightarrow \int x^2 + 14x + 49$$

$$\frac{x^3}{3} + \frac{14x^2}{2} + 49x + C$$

5

$$e) \int_0^2 x^3 - 2x + 1 \, dx$$

$$\int_0^2 \frac{x^4}{4} - \frac{2x^2}{2} + x + C$$

$$\int_0^2 \frac{x^4}{4} - x^2 + x + C$$

$$\frac{(2)^4}{4} - (2)^2 + 2 + C - 0$$

$$= 2$$

4

$$f) \int_1^4 (x+6)(x+2) \, dx$$

$$\int_1^4 x^2 + 2x + 6x + 12$$

$$\int_1^4 x^2 + 8x + 12 \Rightarrow \frac{x^3}{3} + \frac{8x^2}{2} + 12x + C$$

$$\left[\frac{(4)^3}{3} + \frac{8(4)^2}{2} + 12(4) + C \right] - \left[\frac{(1)^3}{3} + \frac{8(1)^2}{2} + 12(1) + C \right]$$

$$133.3 - 16.3$$

$$= 117$$

6

Q3.

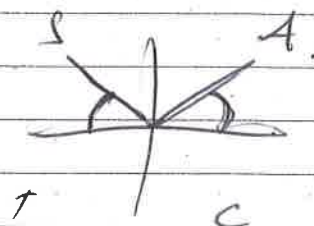
a) $\sin x = 0.53$

$$\sin^{-1}(0.53) = x$$

$$x = 32.001$$

$$= 32.01$$

$$= 360 - 180 - 32.01 = 147.99$$



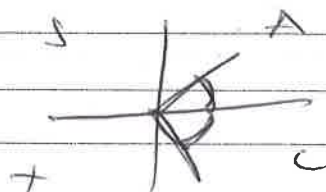
b) $\cos x = 0.11$

$$x = \cos^{-1}(0.11)$$

$$x = 83.68$$

$$= 83.68$$

$$= 360 - 83.68 = 276.32$$

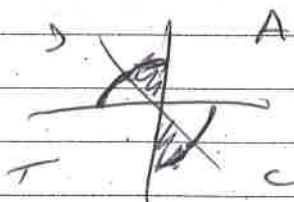


c) $\tan x = -0.73$

$$x = 36.13$$

$$180 - 36.13 = 143.87$$

$$360 - 36.13 = 323.87$$



2

2

3

Q4 a) $y = 6x^3 + 2x^2 + x - 1$

$\frac{dy}{dx} = 12x^2 + 4x + 1 - 0$

x

x

1

b) $y = (x+8)(x+7)$

$\frac{dy}{dx} = x^2 + 7x + 8x + 56$

$\frac{dy}{dx} = 2x + 7x + 8x$

$2x + 15x$

2

c) $y = 5x^2 + 7x + 5$

$\frac{dy}{dx} = 10x + 7$

2

d) $y = \sin 6x$

$\frac{dy}{dx} = 6 \cos 6x$

2

e) $y = \frac{1}{x^3}$

$\frac{dy}{dx} = 1x^{-3} = -3x^{-4}$

2

f) $y = \sin(x^5)$

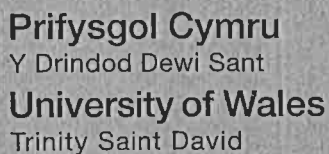
$\frac{dy}{dx} = x^5 \cos x$

g) $y = \frac{x^2 + 4x + 7x}{\text{for } x}$

X

h) $y = (8x^2 + 2x - 1)^6$

X



43.31

SURNAME: Wright

FORENAME(S): Alexander

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	1701086
2	Title of Examination Paper	Analytical methods exam 2
3	Module Code	
4	Date and Time of Examination	01/01
5	Examination Venue	1Q103
6	Seat Number	
7	Number of Answer Books handed in	

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)



1.
a) $z_1 = 5 + 2j$ $z_2 = 6 - 3j$

i) $z_1 + z_2$

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

$$11 - j$$

2

ii) $z_1 - z_2$

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

$$-1 + 5j$$

1

iii) $z_1 z_2$

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

$$30 - 15j + 12j - 6j^2$$

$$30 - 3j - 6j^2$$

1

2.

a) $\int 5x^3 - 2x^2 + 6 \, dx$

$$\frac{5x^4}{4} - \frac{2x^3}{3} + 6x + C$$

4

b) $\int \frac{1}{x^7} \, dx$

$$\int x^{-7} \, dx$$

$$\frac{x^{-6}}{-6} + C$$

3

c) $\int \cos 2x \, dx$

d) $\int (x+7)^2 \, dx$

$$\int (x+7)(x+7) \, dx$$

$$\int x^2 + 7x + 7x + 49 \, dx$$

~~$$\int x^2 + 14x + 49 \, dx$$~~

$$\int x^2 + 14x + 49 \, dx$$

$$\frac{x^3}{3} + \frac{14x^2}{2} + 49x + C$$

5

e) $\int_0^2 x^3 - 2x + 1 \, dx$

$$\int_0^2 \frac{x^4}{4} - \frac{2x^2}{2} + 1x + C$$

$$\left(\frac{x^4}{4} - \frac{2x^2}{2} + 1x + C \right)_0^2$$

$$\left(\frac{2^4}{4} - \frac{2 \times 2^2}{2} + 1 \times 2 + C \right) = 2$$

$$\left(\frac{0^4}{4} - \frac{2 \times 0^2}{2} + 1 \times 0 + C \right) = 0$$

$$2 - 0 = 2$$

f) $\int_1^4 (x+6)(x+2) \, dx$

~~$$\int_1^4 x^2 + 2x + 6x + 12 \, dx$$~~

$$\int_1^4 x^2 + 8x + 12 \, dx$$

~~$$\frac{x^3}{3} + \frac{8x^2}{2} + 12x + C$$~~

~~$$\left(\frac{x^3}{3} + \frac{8x^2}{2} + 12x + C \right)_1^4$$~~

$$\left(\frac{4^3}{3} + \frac{8 \times 4^2}{2} + 12 \times 4 + C \right) = 133.33$$

$$\left(\frac{1^3}{3} + \frac{8 \times 1^2}{2} + 12 \times 1 + C \right) = 16.33$$

$$133.33 - 16.33 = 117$$

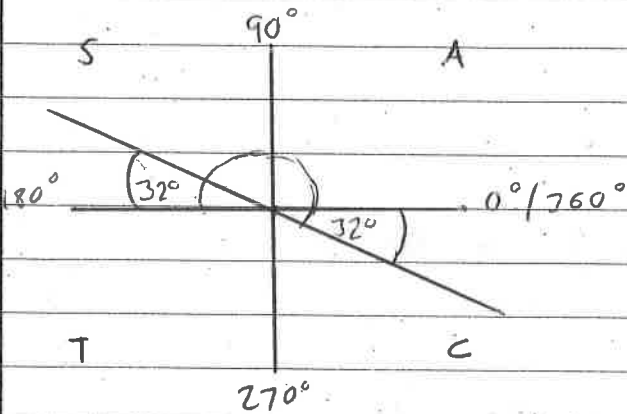
4

6

3.

a) $\sin x = 0.53$

$$\sin^{-1}(0.53) = 32^\circ$$

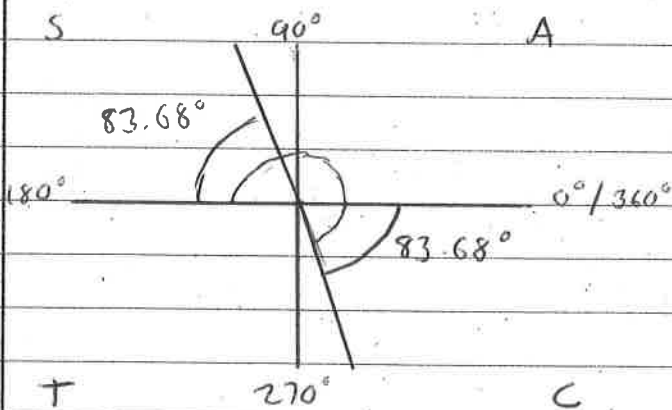


$$x = 180 + 32 = 212^\circ$$

$$x = 212^\circ$$

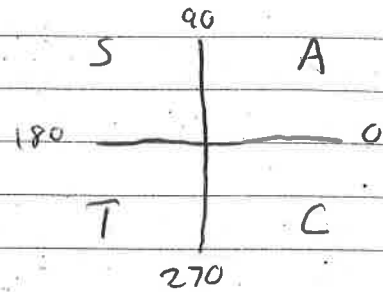
b) $\cos x = 0.11$

$$\cos^{-1}(0.11) = 83.68^\circ$$



$$180 + 83.68 = 263.68^\circ$$

$$x = 263.68$$

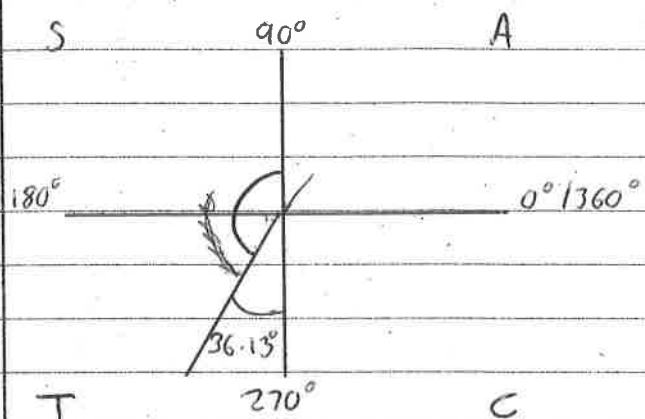


1

1

c) $\tan x = -0.73$

$$\tan^{-1}(-0.73) = -36.13$$



$$180 - 36.13 = 143.87^\circ$$

$$x = 143.87$$

Question No.

Examiner Only

y Cwestiwn

Arholiwr yn unig