



Prifysgol Cymru
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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: ISAAC

FORENAME(S): CHRISTOPHER

1	Student Number	ISA18847837
2	Title of Examination Paper	Maths TEST 1
3	Module Code	GOEN4001
4	Date and Time of Examination	20 th Jan 25
5	Examination Venue	Hill House
6	Seat Number	DS
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	
a	10
b	5
c	1
d	0
Q2 a	10
b	0
c	6
d	0
e	7
Q3 a	0
b	4
c	4
d	4
Total	51%

(Gweler yr ochr arall am y fersiwn Cymraeg)

L2

51%

one.

a i, $y = 3x^4 + 5x^3 + 4x^2 + 7x - 10$

$$\frac{dy}{dx} = 12x^3 + 15x^2 + 8x + 7 - 0 \quad \text{ii) } \textcircled{2}$$

a ii, $y = \frac{1}{x^3} + \frac{1}{5\sqrt{x^2}}$

$$\frac{dy}{dx} = x^{-3} + x^{-\frac{1}{2}} \quad \text{ii) } \textcircled{0}$$

a iii, $y = 2\sin(2x) + 3\cos(3x) + \frac{1}{5}\tan(5x)$

$$\frac{dy}{dx} = 4\cos 2x - 9\sin 3x + \frac{1}{5}\sec^2 5x$$

$$\frac{dy}{dx} = 4\cos 2x - 9\sin 3x + \frac{1}{5}\sec^2 5x \quad \text{iii) } \textcircled{0}$$

a iii, $y = 7x^3 \sin 5x$

$$u = 7x^3 \quad \frac{du}{dx} = 21x^2$$

$$v = \sin 5x \quad \frac{dv}{dx} = 5\cos 5x$$

$$\frac{dy}{dx} = u \left(\frac{dv}{dx} \right) + v \left(\frac{du}{dx} \right) \quad \text{iv) } \textcircled{4}$$

$$\frac{dy}{dx} = 7x^3 (5\cos 5x) + \sin 5x (21x^2)$$

a v, $y = \frac{2\sin 5x}{3e^{5x}}$

$$u = 2\sin 5x$$

$$\frac{du}{dx} = 10\cos 5x$$

$$v = 3e^{5x}$$

$$\frac{dv}{dx} = 15e^{5x}$$

$$\frac{dy}{dx} = \frac{v \left(\frac{du}{dx} \right) - u \left(\frac{dv}{dx} \right)}{v^2}$$

$$\frac{dy}{dx} = \frac{3e^{5x} (10\cos 5x) - 2\sin 5x (15e^{5x})}{(3e^{5x})^2}$$

~~Need go further~~

Q1

16/35

Q1a.

10/22

a vi $y = 5(2x^3 + 4)^3$

$$= 15(2x^3 + 4)^2$$

$$= 30(6x)$$

vi) 0

a vii $y = \sqrt[3]{(x^4 + 5)^2}$

$$\frac{dy}{dx} = x^{\frac{4}{3}} + 5^{-\frac{1}{3}}$$

vii) 0

B,

$$W = 5x^5 + 4x^2y^4 + 3y^3 + \sin x - 5.$$

Q/b

$$\frac{dw}{dx} = 25x^4 + 8xy^4 + \cos x$$

$$\frac{dw}{dx} = 100x^3 + 8y^4 + -\sin x$$

$$\frac{dw}{dx} = 32xy^3 + \cos x$$

$$\frac{dw}{dxdy} = 32xy^3 \checkmark$$

$$\frac{dw}{dxdy} = 32xy^3$$

$$\frac{dw}{dxdy} = 16x^2y^3 + 9y^2$$

$$\frac{dw}{dxdy} = 64x^2y^2 + 18y$$

$$\frac{dw}{dxdy} = 32xy^3$$

$$\frac{dw}{dxdy} = 16x^2y^3 + 9y^2 \checkmark$$

$$\frac{dw}{dxdy} = 64x^2y^2 + 18y \times$$

$$\frac{dw}{dxdy} = 32xy^3 + 18 \times$$

$$\frac{dw}{dxdy} = 32xy^3 \checkmark$$

5

5/6

c, $y = \cos 2x + x^2$

Q1c

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 4x^2 - 8x + 8\sin 2x + 2.$$

$$\frac{dy}{dx} = -2\sin 2x + 2x$$

$$\frac{d^2y}{dx^2} = -4\cos 2x + 2$$

$$\begin{aligned} & -4\cos 2x + 2 - 4(-2\sin 2x + 2x) + 4(\cos 2x + x^2) = 4x^2 - 8x + 8\sin 2x + 2. \\ & = 4x^2 - 8x + 8\sin 2x + 2. \end{aligned}$$

1/4

①

d, $y = xe^{2x}$

3rd derivative of .

Q1d

$$y' = 2xe^{2x}$$

$$y'' = 4xe^{2x}$$

$$y''' = 8xe^{2x}$$

0/3

②

2 a

$$\frac{3x-4}{(x+2)(x-5)}$$

$$\frac{3x-4}{(x+2)(x-5)} = \frac{A}{x+2} + \frac{B}{x-5} \quad \checkmark$$

$$\begin{aligned} \text{let } x &= -2 \\ x &= 5 \end{aligned}$$

(1.2)

$$\begin{aligned} 3x-4 &= A(x-5) + B(x+2) \\ 3(-2)-4 &= A(-2-5) + B(-2+2) \\ -6-4 &= A(-7) + B(0) \end{aligned}$$

$$A = \frac{-10}{-7}$$

$$= 1.43 \quad \checkmark$$

(1.5)

$$\begin{aligned} 3x-4 &= A(x-5) + B(x+2) \\ 3(5)-4 &= A(5-5) + B(5+2) \\ 15-4 &= A(0) + B(7) \\ B &= \frac{11}{7} = 1.57 \quad \checkmark \end{aligned}$$

$$\frac{3x-4}{(x+2)(x-5)} = \frac{1.43}{(x+2)} + \frac{1.57}{(x-5)}$$

Q2

23/33

Q20

10/10

(10)

2 B,

$$\sin(100) = 0.98$$

Q2b

0/4

X

2c

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

$$\tan^2 x - 6 \tan x + 8 = 0$$

Q2c

 2×4

$$(x-4)(x-2)$$

$$\tan^{-1}(-4) = 75.96^\circ$$

$$\tan^{-1}(-2) = 63.43^\circ$$

$$75.96 + 180 = 255.96$$

$$63.43 + 180 = 243.43$$

$$x = 75.96 \text{ or } 255.96$$

$$x = 63.43 \text{ or } 243.43$$

good!

6

6/6

2d

$$y = x^2 \quad y = x + 20$$

$$y = x^2 + x + 20 = 0$$

$$A = 1$$

$$B = 1$$

$$C = 20$$

$$\frac{-1 \pm \sqrt{1^2 - 4 \times 1 \times 20}}{2 \times 1}$$

$$x_1 = \frac{-1 + \sqrt{79}}{2} \quad \text{or } -0.5 + 4.44$$

$$x_2 = \frac{-1 - \sqrt{79}}{2} \quad -0.5 - 4.44$$

2e i $\sin x = 0.6$

$$\sin^{-1}(0.6) = 36.86^\circ$$

$$180 - 36.86 = 143.14$$

$$x = 36.86^\circ \text{ or } 143.14^\circ$$

e ii $7 \cos x = 6 \quad \frac{6}{7} = 0.857$

$$\cos^{-1}(0.857) = 31.01^\circ$$

$$360 - 31.01 = 328.99^\circ$$

$$x = 31.01^\circ \text{ or } 328.99^\circ$$

Q2d

0/6

Q2e

7/7

(2)

(3)

iii $-3 \tan x = 2$

$$= \frac{2}{-3} = 0.666 \checkmark$$

$$\tan^{-1}(0.666) = 33.66 \checkmark$$

$$360 - 33.66 = 326.34 \checkmark$$

$$180 - 33.66 = 146.34 \checkmark$$

(2)

3a

i, $\ln(x^2 + 2x) = \ln(3) + \ln(x+1)$

$$= \ln(x^2 + 2x) + \ln(x+1)$$

$$= (x^2 + 2x)(x+1)$$

$$= x^2 + 1 + 2x^2 + 2 \cdot X$$

(0)

ii, $\log(x+3) + \log(2x+1) = 2\log(3x-1)$

$$= \log(x+3) + \log(2x+1) = (3x-1)$$

$$= (x+3) + (2x+1) = (3x-1)$$

(0)

iii $5^{(x+2)} \times 2^{(2-x)} = 3^{(x+3)}$

(0)

Q3

12/32

Q3a

0/18

$$\text{iv, } \frac{5x+2}{2x-3} = \frac{3}{4}$$

$$\frac{\cancel{4} + 3}{\cancel{2x-3} \cdot 2} = \frac{5x+2}{4} + \frac{2x-3}{3} \times \textcircled{0}$$

$$\text{v, } \frac{(3x-2)}{4} + \frac{(x+5)}{2} = \frac{7}{3} \times \textcircled{0}$$

b i $z^2 - 12z + 35$

$$5 \times 7 = 35$$

$$(z-5)(z-7) \checkmark$$

(2)

Q3b

ii $m^2 - 121$

$$11 \times 11 = 121$$

$$(m-11)(m+11) \checkmark$$

(2)

4/6

iii $KL + 2km + 5nL + 10nm$

$$(KL + 2km) = (5nL + 10nm) \times$$

(0)

c i $4P + 11P + 6 = 0$

$$= P + 11P + 24 \quad 3 \times 8 = 24$$

$$\left(\frac{P+3}{4}\right)\left(\frac{P+8}{4}\right)$$

$$= (4P+3)(P+2)$$

$$P = -\frac{3}{4} \text{ or } -0.75$$

$$P = -2 \checkmark$$

(2)

Q3c

4/4

ii $s^2 + 16s + 63 = 0$

$$7 \times 9 = 63$$

$$= (s+7)(s+9)$$

$$s = -7$$

$$s = -9$$

(2)

Question No.

Examiner Only

$$d, \quad 3x^2 + 4x - 10 = 0$$

$$A = 3$$

$$B = 4$$

$$C = -10$$

$$\frac{-4 \pm \sqrt{4^2 - 4 \times 3 \times -10}}{2 \times 3}$$

$$x = 1.27$$

$$x = -2.61$$

Q3c

4/4