



Gower College Swansea
Coleg Gŵyr Abertawe

Examination Answer Book

12 Pages

Instructions to candidates

1. Please give the information requested in the boxes below and enter your name in the space provided at the top right of the page.
2. Wet the gum at the top right hand corner of the page, fold over and seal down in order to conceal 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.
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6. No part of this book is to be torn out; it must be handed in complete.
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8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

Surname Delaney
First name(s) Benjamin
FOLD HERE

1	Student Number	DEL18840714
2	Title of Examination Paper	Mathematics test1
3	Reference Number of Examination/ Module Number	M4X 00391
4	Date and Time of Examination	1801, 2021
5	Examination Venue	Gower colladge
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	
a	10
b	2
c	4
d	2
e	1
Q2	
a	3
b	5
c	0
d	0
e	0
	27/80

34%

Question 1

Q. 1 a

a.

i. $y = 4x^4 + 5x^3 + 2x^2 - 3x + 9$

10

$$\frac{dy}{dx} = 16x^3 + 15x^2 + 4x - 3 \quad \checkmark \quad (2)$$

ii. $y = 5(2x + 4)^3$

$$\frac{dy}{dx} = 10x + 20^3 \quad \times \quad \text{on}$$

iii. $y = \sqrt{x} + \ln x$

$$\frac{dy}{dx} = x^{-0.5} + \frac{1}{x} \quad \checkmark \quad (1)$$

iv. $y = \sin 5x + 6 \cos 2x + 3 \tan 3x$

$$\frac{dy}{dx} = 5 \cos 5x + 12 \sin 2x + 9 \sec^2 3x \quad \checkmark \quad (3)$$

v. $y = x^3 \cos x$

$$\frac{dy}{dx} = -3x^2 \sin x \quad \times \quad \text{on}$$

vi. $y = \frac{2x^2 + 3x}{e^{5x}}$

$$\frac{dv}{dx} = 5 \cdot 4x$$

$$\frac{du}{dx} = 4x + 3x \quad \times$$

$$v = e^{5x} \quad \checkmark$$

$$u = 2x^2 + 3x \quad \checkmark$$

$$\text{vi} \quad \frac{dy}{dx} = e^{3x} (-5e^{4x}) - 2x^2 \cdot 3x (4x+3x)$$

$$\text{vii} \quad y = e^{2x} \sin 2x$$

$$u = e^{2x} \checkmark$$

$$v = \sin 2x \checkmark$$

$$\frac{du}{dx} = 2e^{2x} \checkmark$$

(4)

$$\frac{dv}{dx} = 2 \cos 2x \checkmark$$

$$\frac{dy}{dx} = e^{2x} (2 \cos 2x) + \sin 2x (2e^{2x})$$

$$\text{b.} \quad z = 3x^6 + 5x^2y^4 + 2y^3$$

$$\frac{\partial z}{\partial x} = 18x^5 + 10xy^4 \checkmark$$

$$\frac{\partial z}{\partial y} = 20x^2y^3 + 6y^2 \checkmark$$

$$\frac{\partial^2 z}{\partial x^2} = 90x^4 + 10 \checkmark$$

$$\frac{\partial^2 z}{\partial y^2} = 60y + 12 \times$$

$$\frac{\partial^2 z}{\partial y \partial x} = 40xy \checkmark$$

$$\frac{\partial^2 z}{\partial x \partial y} = 40xy \times$$

$$c \quad y = 4x^3 + 5x + 6$$

Q1c

$$\frac{dy}{dx} = 12x^2 + 5 \quad \checkmark$$

4 //

$$\frac{d^2y}{dx^2} = 24x \quad \checkmark$$

$$2(24x) + 3(12x^2 + 5) - 4x - 8 = 36x^2 + 44x + 7$$

$$48x + 36x^2 + 15 - 4x - 8$$

$$36x^2 + 48x - 4x + 15 - 8$$

$$36x^2 + 44x + 7$$

Q1d

$$d \quad y = 5 \cos 2x$$

2 //

$$y' = -5 \sin 2x \quad \checkmark$$

$$y^2 = -12 \cos 2x \quad \checkmark \quad (2)$$

$$y^3 = 24 \sin 2x \quad \checkmark$$

$$y^4 = 48 \cos 2x \quad \checkmark$$

Q1e

(e)

71

81

01

Question TWO.

a.

$$1 = \ln(3x-5) + 4 \ln 3x$$

a

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

$$(3x-5)(3x+4) = (3x-4)^2$$

$$3x-5 + 3x+4 = 3x-4$$

$$3x+3x-3x = -4-4+5$$

$$\longrightarrow 3x = -3 \quad x = -1$$

$$\text{ii } 3^{2+x} \times 2^{3-x} = 5^x$$

$$6^{2+x} \times 6^{2-x} = 5^x$$

$$\text{iii } \frac{4}{2x+5} = \frac{6}{x+2}$$

(3)

$$6x(2x+5) = 4x(x+2)$$

$$12x + 30 = 4x + 8$$

$$12x - 4x = -30 + 8$$

$$8x = -22$$

$$x = -\frac{11}{4}$$

$$\text{iv, } \frac{(x+2)}{6} + \frac{(7x+1)}{9} = \frac{x}{18}$$

$$6 \times 9 \times 18 = 972$$

$$6(7x+1) + 9(x+2) = \frac{x}{18} \times 18$$

$$42x + 6 + 9x + 2 = \frac{x}{18} \times 18$$

L

$$\text{B i } \underbrace{t^2 + 8t + 15}$$

$$\begin{array}{r} 18 \\ \hline 1 \times 15 \\ 3 \times 5 \end{array}$$

$$(t^2 + 3t) + (5t + 15)$$

$$t(t + 3t) + 5(t + 3)$$

(2)

$$(t + 3t) \quad (t + 5)$$

✓ ✓

Q2b

5 //

i. $5q^2 + 17q + 6$

$$(5q^2 + 2q) + (15q + 6)$$

$$\begin{array}{r} 30 \\ 1 \times 30 \\ 2 \times 15 \\ 3 \times 10 \end{array}$$

$$q(5q + 2) + 3(5q + 2)$$

②

$$(5q + 2)(q + 3)$$

iii $x^2 - 121$

$$(+11)(-11)$$

x

$$\begin{array}{r} 121 \\ 1 \times 121 \\ 11 \times 11 \end{array}$$

09

iv $(m^2 - 4mn) + (3m - 12n)$

$$m(m - 4n) + 3(m - 4n) \quad \text{①}$$

~~Factor~~

$$(m - 4n) \text{ or } c$$

c

$$i. \quad 6x^2 + 19x + 15 = 0$$

90

$$1 \times 90$$

$$2 \times 45$$

$$3 \times 30$$

$$5 \times 18$$

$$(6x^2 + 9x) + (10x + 15) = 0$$

$$x(6x + 9) + 5(2x + 3)$$

$$6 \times 15$$

$$9 \times 10$$

$$(6x + 9) + x + 5 = 0$$

$$16x = 5$$

$$x = \frac{5}{16}$$

*

A B C

$$d. \quad 6x^2 - 13x - 8 = 0$$

48

$$1 \times 48$$

$$2 \times 24$$

$$3 \times 16$$

$$Quadratic = \frac{5(x)}{(ax^2 + bx + c)}$$

$$= \frac{(Ax + B)}{(ax^2 + bx + c)}$$

$$A = 6x^2$$

$$B = 13x$$

$$C = 8$$

$$(6x^2 + 16x)(3x - 8)$$

$$x(6x + 16)(3x - 8)$$

Q2c

0

Q2d

0

*

Question 2

C.

ii $x^2 - 2x + 24$

~~$x^2 - 2x + 24$~~

0/

~~$2x + 24 -$~~

X

$-2x + 24 - x^2$

iii $2x^2 - 21 = 11x$

0/

$\hookrightarrow$

~~$1 + x - 2x^2 + 21$~~

~~32~~
 ~~1×32~~
 ~~2×16~~
 ~~4×8~~
 ~~8×4~~
 ~~16×2~~

$2x^2 - 21 - 11x$

$\frac{22}{1 \times 22}$

$(2x^2 - 1) + (22 - 11x)$

X

$x(2x+1) + 11(2-x)$

$(2x+1) + (x+11)$

X

either $x = (2x+1)$ or $(x+11)$

1.45

e =

$$T = 2\pi \sqrt{\frac{L}{mg\eta}}$$

$$M = 2\pi \sqrt{\frac{E}{T\eta g}}$$

x

Q

Q2e

Q

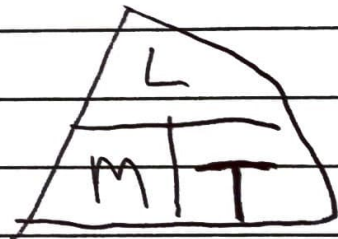
$$\text{Time} = 2\pi \sqrt{\frac{L}{mg\eta}}$$

x



$$\text{Time} = \frac{L}{g}$$

$$M =$$



* question 1

and the line

e. A Curve $S = x^2 - 6x + 5$ and the line $y = x - 3$ intersect at the points S and T

Q1e

↓

$$x^2 - 6x + 5 = x - 3 \quad \checkmark \quad \textcircled{1}$$

$$y = x^2 - 6x + 5$$

$$y = x - 3$$

$$S =$$

$$T =$$