



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

ACDB 4003

Complete, fold and seal
(see note 2 below)

SURNAME: Giosph

FORENAME(S): Teirion Cellan

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 read 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	2304199
2	Title of Examination Paper	~~ACDB 4003~~ mathematics EXAM
3	Module Code	ACDB 4003
4	Date and Time of Examination	1/05/2024
5	Examination Venue	306
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	9
Q2	3
Q3	1
Q4	0
Q5	5
Q6	1
Q7	4
Q8	0
Total	23

23/0

i, $3x + 2x + 5x + 4y - 6y - 9y - 2z + 3z + 10z$
 $= 10x - 11y + 11z$ ✓

(2)

ii, $x(x+5) - (x-4)$
 $x^2 + 5x - x + 4$ ✓
 $= x^2 + 4x + 4$
 Simplify.

(1)

iii, $3q^1r^1 \times 4p^1q^3 \times 5q^1r^2$
 $60q^5r^3p$ ✓

(1)

iv, $\frac{12p^2q^3r}{6p^3q^3r^{-3}} - \cancel{12p^2q^3r}$
 $= 2p^{-1}r^{-2}$ ✓ $4q^0 = 1$

(2)

v, $\frac{2 \cancel{p}^2}{16h} \times \frac{8 \cancel{p}^2 h^2}{4 \cancel{p} h} \times \frac{32 \cancel{p} h^3}{64 \cancel{p}^3}$
 $= \frac{512 \cancel{p}^2 q^2 h^5}{4096 \cancel{p}^4 h^2}$
 $= 0.125 \cancel{p}^{-2} q^2 h^3$ ✓

(2)

2i, ~~quadratic~~ quadratic equation

$$a = x^2 = 1$$

$$b = 10x = 10$$

$$c = -25$$

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

$$= \frac{-10 \pm \sqrt{10^2 - 4 \times 1 \times -25}}{2 \times 1}$$

$$x_1 = -0.2, x_2 = -0.2, x = -\frac{10}{2} = -5$$

(3)

4i

$$a = [2i - 3j + 4k] \quad b = [3i + 3j - k]$$

$$a \cdot b = [2i+1i - 3j+3j + 4k-k] = [3i \quad 0 \quad 3k]$$

4iv, ~~4ii~~ $a \cdot b$ is a scalar! not a vector $a \times b$ is a vector
~~the angle between is the cross product.~~

$$a \times b = [2 \times 1 - 3 \times 3 \quad 4 \times -1 - 2 \times 3] = [2 \quad -9 \quad -4]$$

5

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 1 \\ 3 & 4 & -2 \end{bmatrix}$$

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$\det a = a \begin{vmatrix} e & f \\ h & i \end{vmatrix} - b \begin{vmatrix} d & f \\ g & i \end{vmatrix} + c \begin{vmatrix} d & e \\ g & h \end{vmatrix}$$

$$= 1 \begin{vmatrix} -1 & 1 \\ 4 & -2 \end{vmatrix} - 2 \begin{vmatrix} 2 & 1 \\ 3 & -2 \end{vmatrix} + 3 \begin{vmatrix} 2 & -1 \\ 3 & 4 \end{vmatrix}$$

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

$$\det a = 70$$

Inverse

$$A^{-1} = \left(\frac{1}{\det A} \right) a_{ij} A$$

6,

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

$$\begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

$$= \begin{bmatrix} 1 & -2 & 3 \\ -2 & -1 & -1 \\ 3 & -4 & -2 \end{bmatrix}$$

X

(1)

7a

i.

$$y = 5x - 3 \quad \frac{dx}{dy} = x^5 - 3 \quad \text{X}$$

ii,

$$y = 4x + 10x^{\frac{1}{2}} + \frac{1}{6} \quad \frac{dx}{dy} = x^4 + 2 \ln x^{10-1} + 6 \ln 5 \quad \text{X}$$

iii,

$$y = \frac{2}{x^5} + 9x^{\frac{3}{5}} \quad \frac{dx}{dy} = 2 \ln x^{5-1} + 3 \ln x^{\frac{3}{5}-1} \quad \text{X}$$

iv,

$$y = \cos(20x) \quad \frac{dx}{dy} = \frac{1}{20} \sin(20x) \quad \checkmark$$

(1)

v,

$$y = x^2 \cdot \sin(x) \quad \frac{dx}{dy} = 2x^{2-1} \times \cos(x)$$

need product rule here!

(1)

vi,

$$y = (8x+3)^5 \quad \frac{dx}{dy} = 5(8x+3)^4 \cdot 8$$

vii,

$$y = 2e^x + \ln(x) \quad \frac{dx}{dy} = 2e^{2x} + \frac{1}{x} \quad \checkmark$$

(1)

766

$$y = \frac{u}{v}, \quad \frac{dy}{dx} = \frac{\frac{du}{dx} \cdot v - u \cdot \frac{dv}{dx}}{v^2}$$

$$y = \frac{(x+3)}{(1+x^2)}$$

$$u = (x+3) \quad \text{convert to} \quad v = (1+x^2)$$

$$y = \frac{(x+3)}{(1+2x^{2-1})}$$

$$\frac{(1+2x^{2-1}) \times \frac{d(x+3)}{dx} - (x+3) \cdot \frac{d(1+2x^{2-1})}{dx}}{v^2}$$

$$81. \int (4x + x^3) dx$$

X

3a
i,

$$4^{2x-1} = 3^{x+1}$$

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

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

#

X

More revision needed prior to
sitting exams to firm & practise!