



PRIFYSGOL CYMRU

Y Drindod Dewi Sant

UNIVERSITY OF WALES

Trinity Saint David

Examination Answer Book

24 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 and seal 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	1703131
2	Title of Examination Paper	Maths
3	Module Code	M4x01015
4	Date and Time of Examination	15/02/18
5	Examination Venue	M4411
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	13 1/18
2	1/6
3	0/16
4	7/9
5	6/8
6	7/7
7	5/9
8	9/9
Total	48 1/80

Please complete this section and SEAL before the examination starts.

Surname Baker (Block Capitals) Forename(s) William Henry

Complete section, remove strip, fold as indicated and SEAL

PULL & TEAR

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$$1) \quad i) \quad AB = \begin{bmatrix} 1 \times 2 + (-3) \times 0 + 2 \times 4 & 1 \times 1 + (-3) \times (-1) + 2 \times 2 & 1 \times (-3) + (-3) \times (-1) + 2 \times 1 \\ 4 \times 2 + 0 \times 0 + 2 \times 4 & 4 \times 1 + 0 \times (-1) + 2 \times 2 & 4 \times (-3) + 0 \times (-1) + 2 \times 1 \\ 5 \times 2 + \overset{1 \times 0}{\cancel{1 \times 0}} + 1 \times 4 & 5 \times 1 + 1 \times (-1) + 1 \times 2 & 5 \times (-3) + 1 \times (-1) + 1 \times 1 \end{bmatrix}$$

$$AB = \begin{bmatrix} 10 & 8 & 2 \\ 16 & 8 & -10 \\ 14 & 6 & -15 \end{bmatrix}$$

$$ii) \quad A-B = \begin{bmatrix} 1-2 & -3-1 & 2-3 \\ 4-0 & 0-(-1) & 2-(-1) \\ 5-4 & 1-2 & 1-1 \end{bmatrix}$$

$$A-B = \begin{bmatrix} -1 & -4 & -1 \\ 4 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$$

$$iii) A+B = \begin{bmatrix} 1+2 & -3+1 & 2+(-3) \\ 4+0 & 0+(-1) & 2+(-2) \\ 5+4 & 1+2 & 1+1 \end{bmatrix}$$

$$A+B = \begin{bmatrix} 3 & -2 & -1 \\ 4 & -1 & 0 \\ 9 & 3 & 2 \end{bmatrix}$$

$$B^T = \begin{bmatrix} 2 & -1 & 1 \\ 0 & 1 & 2 \\ 3 & 3 & 2 \end{bmatrix}$$

$$\frac{4}{4}$$

4a)

$$a \times b = (1 \times 3) - (2 \times 3)$$

$$a \times b = (1 \times (-3) - 3 \times 2, 3 \times 3 - 2 \times (-3), 2 \times 2 - 1 \times 3)$$

$$a \times b = (-9, 15, 1)$$

$$Q1 = \frac{13\frac{1}{2}}{18}$$

4b)

~~4a)~~

$$|a \times b| = \sqrt{a^2 + b^2 + 1^2} \quad |a| = \sqrt{14}$$

$$|b| = \sqrt{22}$$

$$|a \times b| = \sqrt{307}$$

$$\frac{7}{7}$$

$$\frac{|a| \times |b|}{|a \times b|} = \sin \theta$$

$$\sin^{-1} \left(\frac{\sqrt{14}}{\sqrt{22}} \right) = 52.9$$

$$\text{angle} = 52.9^\circ$$

$$\frac{90^\circ}{2} = 45^\circ$$

$$7) \det A = 1(2 \times (-1) - 2 \times 3) - 1(1 \times (-1) - 2 \times 1) + 6(1 \times 3 - 2 \times 1)$$

$$\det A = -11$$

8)

$$\begin{bmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$$

Q7 = 5/7

5/7

$$\begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & 3 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$$

$$\begin{bmatrix} -8 \times 1 + 19 \times 1 + (-10) \times 1 & -8 \times 1 + 19 \times 2 + (-10) \times 3 & -8 \times 6 + 19 \times 2 + (-10) \times (-1) \\ 3 \times 1 + (-7) \times 1 + 4 \times 1 & 3 \times 1 + (-7) \times 2 + 4 \times 3 & 3 \times 6 + (-7) \times 2 + 4 \times (-1) \\ 1 \times 1 + (-2) \times 1 + 1 \times 1 & 1 \times 1 + (-2) \times 2 + 1 \times 3 & 1 \times 6 + (-2) \times 2 + 1 \times (-1) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -8 & 19 & -10 \\ 3 & -7 & 4 \\ 1 & -2 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 4 \end{bmatrix}$$

9/9

$$\begin{bmatrix} -8 \times 1 + 19 \times 2 + (-10) \times 4 \\ 3 \times 1 + (-7) \times 2 + 4 \times 4 \\ 1 \times 1 + (-2) \times 2 + 1 \times 4 \end{bmatrix} = \begin{bmatrix} -10 \\ 5 \\ 1 \end{bmatrix}$$

Q8 = 9/9

$$x = -10$$

$$y = 5$$

$$\underline{\underline{z = 1}}$$

$$-10 + 5 + 6 = 1$$

2)

$$T = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$x = \frac{1}{6}$$

$$\frac{1}{6}$$

$$6) |a| = \sqrt{3^2 + 2^2 + 6^2}$$

$$|a| = 7$$

$$a/|a| = (3/7, 2/7, 6/7) =$$

$$\underline{\underline{a = (3/7, 2/7, 6/7)}}$$

$$QJ = \frac{7}{7} \quad \text{②}$$

$$5) \quad \cancel{3 \times 8 + 4 \times 6 + 0 \times 0}$$

$$(3, 4, 0) \cdot (8, 6, 0) = (3 \times 8 + 4 \times 6 + 0 \times 0) = 48$$

$$\sqrt{3^2 + 4^2 + 0^2} = 5 \quad \checkmark$$

$$\underline{\underline{\text{angle} = 60^\circ}}$$

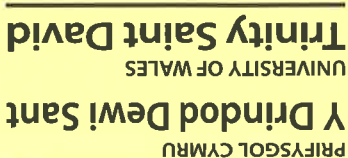
$$\sqrt{8^2 + 6^2 + 0^2} = 10 \quad \checkmark$$

$$\cos^{-1} \left(\frac{48}{50} \right) = 60^\circ$$

$$QJ = \frac{6}{8} \quad \text{②}$$

$$\Phi_2 = \frac{0}{16}$$

AR GYFER DEFNYDD GWEINYDDOL YN UNIG, TYNNWCH Y STRIBYN TYLLOG I FFWRDD YN OFALUS

[illegible]

Cyfenw

A wnewch chi lenw'r rhan hon a'i SELIO cyn i'r arholiad ddechrau.

(LLYTHRENNAU BREISION) Enw(au) cyntaf

PLYGWCH