



12 Pages

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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]

(Gweler yr ochr arall am y fersiwn Cymraeg)

Examiner Only

5

92%
Very good

✓ GT
Feb 25

1

a) $5x + y - 2z - 3x - 4y + z + 2x - y + 3z$

$$= 5x - 3x + 2x + y - 4y - y - 2z + z + 3z$$

$$= 4x - 4y + 2z$$

5

b) $2x(x+3) - x(x+6)$

$$= 2x^2 + 6x - (x^2 + 6x)$$

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

$$= x^2$$

5

c) $2p^4qr \times 3pq^2 \times 4pr^4$

$$= 6p^5q^3r \times 4pr^4$$

$$= 24p^6q^3r^5$$

5

d) $\frac{12p^5qr}{3p^3q^2r^{-2}}$

$$= 12p^5qr \times \frac{1}{3}p^{-3}q^{-2}r^2$$

$$= 4p^2q^{-1}r^3$$

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e) $\frac{fg}{4h} \times \frac{gh^2}{fh} \times \frac{8fh^3}{2f^3}$

$$= \frac{1}{4}fgh^{-1} \times gh^2f^{-1}h^{-1} \times 4fh^3f^{-3}$$

$$= \frac{1}{4}g^2 \times 4f^2h^3 = 1g^2f^2h^3$$

5

2)

$$a) \quad 3(x+2) = 2(x-4)$$

$$3x+6 = 2x-8$$

$$3x+6+8 = 2x-8+8$$

$$3x+14-3x = 2x-3x$$

$$14 = -1x$$

$$-14 = x$$

8

$$b) \quad \frac{x-3}{3} = x + \frac{(x+2)}{6}$$

$$2x-6 = 6x+(x+2)$$

$$2x-6 = 7x+2$$

$$2x-6+6 = 7x+2+6$$

$$2x = 7x+8$$

$$2x-7x = 7x+8-7x$$

$$-5x = +8$$

$$x = -\frac{8}{5}$$

12

$$\begin{array}{rcl}
 3) & 4x + 2y = 2 & \times 1 \\
 & 2x - 5y = 7 & \times 2
 \end{array}$$

$$\begin{array}{rcl}
 4x + 2y = 2 & & \\
 4x - 10y = 14 & (-) & \checkmark
 \end{array}$$

$$+12y = -12$$

$$y = -1$$

Sub $y = -1$ into $4x + 2y = 2$

$$4x + 2(-1) = 2$$

$$4x - 2 = 2$$

$$4x = 2 + 2$$

$$x = 1$$

$$x = 1, y = -1$$

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4)

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 1 & -1 & 1 \\ 1 & 2 & -1 \end{bmatrix} \quad \begin{bmatrix} + & - & + \\ - & + & - \\ + & - & + \end{bmatrix}$$

need to show the 1 here!

$$\begin{array}{ccc} (-1 \times -1) - (1 \times 2) & (1 \times -1) - (1 \times 1) & (1 \times 2) - (-1 \times 1) \\ +1 - 2 & -1 - 1 & 2 - (-1) \\ -1 & -2 & 3 \end{array}$$

$$\begin{array}{ccc} (0 \times -1) - (2 \times 2) & (1 \times -1) - (2 \times 1) & (1 \times 2) - (0 \times 1) \\ 0 - 4 & -1 - 2 & 2 - 0 \\ -4 & -3 & 2 \end{array}$$

$$\begin{array}{ccc} (0 \times 1) - (2 \times -1) & (1 \times 1) - (2 \times 1) & (1 \times -1) - (0 \times 1) \\ 0 - (-2) & 1 - 2 & -1 - 0 \\ +2 & -1 & -1 \end{array}$$

$$|A| = (1 \times -1) - (-2 \times 0) + (2 \times 3)$$

$$|A| = -1 - 0 + 6$$

$$|A| = 5$$

need to show how the cofactor matrix is formed here!

$$\begin{bmatrix} -1 & -2 & 3 \\ -4 & -3 & 2 \\ +2 & -1 & -1 \end{bmatrix} \text{ apply } \begin{array}{ccc} + & - & + \\ - & + & - \\ + & - & + \end{array} = \begin{bmatrix} -1 & 2 & 3 \\ 4 & -3 & -2 \\ -2 & 1 & -1 \end{bmatrix}$$

inverse to get

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

$$A^{-1} = \frac{1}{5} \begin{bmatrix} -1 & 4 & 2 \\ 2 & -3 & 1 \\ 3 & -2 & -1 \end{bmatrix}$$

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5)

$$A^{-1} = \frac{1}{5} \begin{bmatrix} -1 & 4 & 2 \\ 2 & -3 & 1 \\ 3 & -2 & -1 \end{bmatrix} \begin{bmatrix} -2 \\ -2 \\ 3 \end{bmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

$$x = (-1 \times -2) + (4 \times -2) + (2 \times 3) \quad /5$$

$$x = 2 + (-8) + 6 \quad /5$$

$$x = 0$$

$$y = (2 \times -2) + (-3 \times -2) + (3 \times 1) \quad /5$$

$$y = (-4) + (6) + 3 \quad /5$$

$$y = -4 + 9 \quad /5$$

$$y = \frac{5}{5}$$

$$y = 1$$

$$z = (3 \times -2) + (-2 \times -2) + (-1 \times 3) \quad /5$$

$$z = (-6) + (4) + (-3) \quad /5$$

$$z = (-6 + 4 - 3) \div 5$$

$$z = \frac{-5}{5}$$

$$z = -1$$

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