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Q1=[18/35]

Richard James Barrow

Q2=[10/33]

Q3=[20/32]

Sem 2 Maths Exam

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BAR07033451

M4X00391

14 pages

P1 Richard Barrow

Q1)

A)

i) $|A| =$

$$\begin{vmatrix} 2 & 0 & 3 & 2 & 0 \\ 1 & 8 & 3 & 1 & 8 \\ 0 & 2 & 2 & 0 & 2 \end{vmatrix}$$

$$\begin{vmatrix} 2 & 0 & 3 & 2 & 0 \\ 1 & 8 & 3 & 1 & 8 \\ 0 & 2 & 2 & 0 & 2 \end{vmatrix}$$

$$\begin{vmatrix} 2 \times 8 \times 0 = 0 \\ 0 \times 3 \times 0 = 0 \\ 3 \times 1 \times 2 = 6 \end{vmatrix}$$

$$\begin{vmatrix} 0 \times 8 \times 3 = 0 \\ 2 \times 3 \times 2 = 12 \\ 0 \times 1 \times 0 = 0 \end{vmatrix}$$

$$0 + 0 + 6 = 6$$

$$0 + 12 + 0 = 12$$

$$6 - 12 = -6$$

$$\underline{|A| = -6} \quad [4/4]$$

ii)

$$|C| = \underline{\text{Not possible}} \quad [1/1]$$

$$\text{iii) } |D| = 2 \times 8 - 4 \times -3$$

$$|D| = 16 + 12$$

$$\underline{|D| = 28} \quad [2/2]$$

P2 Richard Barrow

$$\text{IV)} \quad \begin{array}{|c|c|c|} \hline 2 & 0 & 3 \\ \hline 1 & 8 & 3 \\ \hline 0 & 2 & 0 \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline 3 & 0 & 2 \\ \hline 2 & 5 & 0 \\ \hline 1 & 3 & 6 \\ \hline \end{array} \quad \begin{array}{|c|c|c|} \hline 9 & 9 & 22 \\ \hline 22 & 40 & 20 \\ \hline 4 & 10 & 0 \\ \hline \end{array}$$

$$2 \times 3 + 0 \times 2 + 3 \times 1 = 9$$

$$2 \times 0 + 0 \times 5 + 3 \times 3 = 9$$

$$2 \times 2 + 0 \times 0 + 3 \times 6 = 22$$

$$1 \times 3 + 8 \times 2 + 3 \times 1 = 22$$

$$1 \times 0 + 8 \times 5 + 0 \times 3 = 40$$

$$1 \times 2 + 8 \times 0 + 3 \times 6 = 20$$

$$0 \times 3 + 2 \times 2 + 0 \times 1 = 4$$

$$0 \times 0 + 2 \times 5 + 0 \times 3 = 10$$

$$0 \times 2 + 2 \times 0 + 0 \times 6 = 0$$

$$AB = \begin{array}{|c|c|c|} \hline 9 & 9 & 22 \\ \hline 22 & 40 & 20 \\ \hline 4 & 10 & 0 \\ \hline \end{array}$$

[4/4]

P3

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v)

$$\begin{array}{|c|c|c|} \hline 3 & 0 & 2 \\ \hline 2 & 5 & 0 \\ \hline 1 & 3 & 6 \\ \hline \end{array}$$

$$\begin{array}{|c|c|} \hline 1 & 4 \\ \hline 2 & -5 \\ \hline 3 & 1 \\ \hline \end{array}$$

$$3x_1 + 0x_2 + 2x_3 = 9$$

$$3x_4 + 0x_5 + 2x_1 = 14$$

$$2x_1 + 5x_2 + 0x_3 = 12$$

$$2x_4 + 5x_5 + 0x_1 = -17$$

$$1x_1 + 3x_2 + 6x_3 = 25$$

$$1x_4 + 3x_5 + 6x_1 = -5$$

BC =

$$\begin{array}{|c|c|} \hline 9 & 14 \\ \hline 12 & -17 \\ \hline 25 & -5 \\ \hline \end{array}$$

[4/4]

vi)

Not possible

[1/1]

vii)

Not possible

[1/1]

r P4 Richard Barrow

b)

r

r

r

PS Richard Burrow

(c)

$$\begin{pmatrix} 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ 5 \end{pmatrix}$$

$$A = \begin{pmatrix} 3 & 2 & 1 \\ 1 & 3 & 2 \\ 2 & 1 & 3 \end{pmatrix}$$

correct method
error carried over
negative sign
not included

$$|A| = 3 \times 3 \times 3 = 27$$

$$2 \times 2 \times 2 = 8$$

$$1 \times 1 \times 1 = 1$$

[3/8]

$$2 \times 3 \times 1 = 6$$

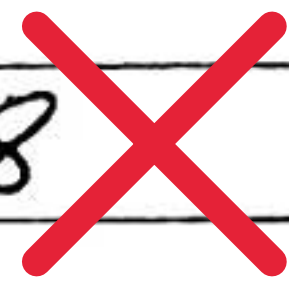
$$1 \times 2 \times 3 = 6$$

$$3 \times 1 \times 2 = 6$$

$$27 + 8 + 1 = 36$$

$$6 + 6 + 6 = 18$$

$$|A| = 18$$



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c)

$$|A_1| \begin{vmatrix} 2 & 2 & 1 \\ 1 & 2 & 2 \\ 3 & 1 & 2 \end{vmatrix} \begin{vmatrix} 2 & 2 \\ 1 & 3 \\ 3 & 1 \end{vmatrix}$$

$$2 \times 3 \times 3 = 18$$

$$2 \times 2 \times 5 = 20 = 39$$

$$1 \times 1 \times 1 = 1$$

$$5 \times 3 \times 1 = 15$$

$$1 \times 2 \times 2 = 4 = 25$$

$$3 \times 1 \times 2 = 6$$

$$|A_1| = 14$$

$$|A_2| \begin{vmatrix} 3 & 2 & 1 \\ 1 & 1 & 2 \\ 2 & 5 & 3 \end{vmatrix} \begin{vmatrix} 3 & 2 \\ 1 & 1 \\ 2 & 5 \end{vmatrix}$$

$$3 \times 1 \times 3 = 9$$

$$2 \times 2 \times 2 = 8 = 22$$

$$1 \times 1 \times 5 = 5$$

$$2 \times 1 \times 1 = 2$$

$$5 \times 2 \times 3 = 30 = 38$$

$$3 \times 1 \times 2 = 6$$

$$|A_2| = -16$$

C P7 Richard Barrow

c)

$$|A_3| \begin{vmatrix} 3 & 2 & 2 \\ 1 & 8 & 1 \\ 2 & 1 & 5 \end{vmatrix} \begin{vmatrix} 3 & 2 \\ 1 & 3 \\ 2 & 1 \end{vmatrix}$$

$$3 \times 3 \times 5 = 45$$

$$2 \times 1 \times 2 = 4 = 52$$

$$2 \times 1 \times 1 = 2$$

$$2 \times 3 \times 2 = 12$$

$$1 \times 1 \times 3 = 3 = 25$$

$$5 \times 1 \times 2 = 10$$

$$|A_3| = 27$$

$$x = \frac{|A_1|}{|A|} \quad y = \frac{|A_2|}{|A|} \quad z = \frac{|A_3|}{|A|}$$

$$x = \frac{14}{18} \quad y = \frac{-16}{18} \quad z = \frac{27}{18}$$

$$x = 0.7 \quad y = -0.8 \quad z = 1.5$$

P8

Richard Barrow

Q2

A)

$$\begin{aligned} \text{i)} \quad & 2+5j + 3+2j \\ & = \underline{5+7j} \quad [1/1] \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad & (3)3+2j + (2)4+3j \\ & = 9+6j + 8+6j \\ & = \underline{17+12j} \quad [3/3] \end{aligned}$$

$$\text{iii)} \quad (2+5j)^2 + 3+2j$$

$$(2+5j)(2+5j) + 3+2j$$

$$4+10j+10j+25j^2 + 3+2j$$

$$\cancel{4} + \cancel{20j} + \cancel{20j} + 25j^2 + \cancel{3} + \cancel{2j}$$

$$7 + 22j + 25j^2$$

$$= \underline{7 + 22j}$$

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$$IV) (2+5j)(3+2j)$$

$$= 6 + 4j + 15j + 10j^2$$

$$= \underline{6 + 19j} \quad [1/3]$$

~~V) $\frac{2+5j}{3+2j}$~~

~~$3-2j$~~

~~$$\frac{(2+5j)(3-2j)}{(3+2j)(3-2j)}$$~~

~~$$\frac{6 + 4j + 15j - 10j^2}{9 - 6j + 6j - 4j^2}$$~~

~~$$\frac{6 + 19j - 10j^2}{9 - 4j^2}$$~~

~~$$\frac{6 + 19j - 10j^2}{9}$$~~

~~9~~

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$$v) \frac{(2+5j)}{(3+2j)} \times \frac{(3+2j)}{(3+2j)} \quad \times$$

~~$$\begin{array}{r} 6 - 10j + 15j - 10j^2 \\ 9 + 6j + 6j + 4j^2 \end{array}$$~~

$$\begin{array}{r} 6 + 4j + 15j + 10j^2 \\ 9 - 6j + 6j - 4j^2 \end{array}$$

$$6 + 19j + 10j^2$$

$$\begin{array}{r} -4 + 19j \\ 9 + 4 \end{array}$$

$$= \frac{-4}{13} + \frac{19}{4}j$$

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b)

$$5x^2 - 8x + 5 = 0$$

$$x = \frac{-8 \pm \sqrt{8^2 - 4(5)(5)}}{2(5)}$$

$$x = \frac{-8 \pm \sqrt{64 - 100}}{10}$$

$$x = \frac{-8 \pm \sqrt{-36}}{10}$$

[3/10]

$$x = \frac{-8 \pm \sqrt{36}}{10}$$

$$x = \frac{-8 \pm 6j}{10}$$

~~Richard Barrow~~

$$x = \frac{-8}{10} + \frac{6j}{10}$$

$$x = \frac{-8}{10} - \frac{6j}{10}$$

P12 Richard Barrow

Q3

A)

i) $\int x(x^2 + 3x) dx$

$$x^3 + 3x^2$$

$$\frac{x^4}{4} + \frac{3x^3}{3}$$

$$= \frac{x^4}{4} + x^3 + C \quad [4/4]$$

ii) $\int ((x+2)(2x+1) - \sin 4x) dx$

$$2x^2 + x + 4x + 2 - \sin 4x$$

~~$$2x^2 + x + 2 - \sin 4x$$~~

$$2x^2 + x + 4x + 2 - \sin 4x$$

$$2x^2 + 5x + 2 - \sin 4x$$

$$\frac{2x^3}{3} + \frac{5x^2}{2} + 2x + \frac{1}{4} \cos 4x + C \quad [4/4]$$

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iii) $\int_0^2 (3x^2 + 20x - 5) dx$

$$\left[\frac{3x^3}{3} + \frac{20x^2}{2} - 5x \right]_0^2$$

$$\frac{3 \times 2^3}{3} + \frac{20 \times 2^2}{2} - 5 \times 2$$

[3/4]

$$[8 + 40 - 10] - [0]$$

$$= -2 = 2$$

iv) $\int_0^1 (5x^4 + 3e^{2x}) dx$

$$\frac{5x^5}{5} + 3e^{2x}$$

[2/4]

$$x^5 + 3e^{2x} + C$$

$$\left[1^5 + 3(2.72)^5 \right] - [0]$$

$$\left[1 + 446.6 \right] - [0] = 447.6$$

P14 Richard Barrow

b)

$$c) \int \underset{\substack{\uparrow \\ u}}{x} \cdot \underset{\substack{\uparrow \\ \frac{dv}{dx}}}{\sin x} dx$$

$$\frac{du}{dx} = 1$$

$$v = -\frac{1}{1} \cos x$$

[7/10]

$$\frac{x}{1} * -\frac{1}{1} \cos x - \int \frac{1}{1} \cos x dx$$

$$\frac{x}{1} * -\frac{1}{1} \cos x - \frac{1}{1} \sin x + C$$

END