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1901059

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ACMA1006

1a

$$i) \begin{matrix} 1, 0, 0 & 2, 0, 14 & 3, 0, 4 \\ 2, -32, 0 & 4, 8, 49 & 6, 0, 14 \\ -7, -8, 0 & -14, 2, 0 & -1, 0, 0 \end{matrix} \begin{pmatrix} 1 & 16 & 7 \\ -30 & 61 & 20 \\ -15 & -12 & -21 \end{pmatrix}$$

$$ii) \begin{matrix} 7, 0, 4 & 1, 0, 14 \\ 14, 24, 14 & 2, 64, 49 \\ -49, 60 & -7, 16, 0 \end{matrix} \begin{pmatrix} 11 & 15 \\ 52 & 115 \\ -43 & 9 \end{pmatrix}$$

$$iii) \begin{pmatrix} 2 & 2 & 5 \\ -2 & 9 & 7 \\ -7 & 9 & 2 \end{pmatrix}$$

iv) can not be calculated

v) can not be calculated

$$vi) \begin{pmatrix} 4 & 24 \\ 4 & 10 \end{pmatrix}$$

$$b) 5x + y + 2z = 32$$

$$x - y + z = 10$$

$$2x + 5y + 2z = 13$$

$$\begin{pmatrix} 5 & 1 & 2 \\ 1 & -1 & 1 \\ 2 & 5 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 32 \\ 10 \\ 13 \end{pmatrix}$$

$$|A| = 5(2-5) - 1(2-2) + 2(5+2)$$

$$= 5(-7) - 1(0) + 2(10)$$

$$= -35 + 20$$

$$= -15$$

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$$A_1 \begin{pmatrix} 32 & 1 & 2 \\ 10 & -1 & 1 \\ 13 & 5 & 2 \end{pmatrix}$$

$$\begin{aligned} |A_1| &= 32(-2-5) - 1(20-13) + 2(50+13) \\ &= 32(-7) - 1(7) + 2(63) \\ &= -224 - 7 + 126 \\ &= -105 \end{aligned}$$

$$A_2 \begin{pmatrix} 5 & 32 & 2 \\ 1 & 10 & 1 \\ 2 & 13 & 2 \end{pmatrix}$$

$$\begin{aligned} |A_2| &= 5(20-13) - 32(2-2) + 2(2-2) \\ &= 5(7) - 32(0) + 2(0) \\ &= 35 \end{aligned}$$

$$A_3 \begin{pmatrix} 5 & 1 & 32 \\ 1 & -1 & 10 \\ 2 & 5 & 13 \end{pmatrix}$$

$$\begin{aligned} |A_3| &= 5(-13-50) - 1(13-20) + 32(5+2) \\ &= 5(-63) - 1(-7) + 32(7) \\ &= -315 + 7 + 224 \\ &= -84 \end{aligned}$$

$$x = \frac{-105}{-15} = 7$$

$$y = \frac{35}{-15} = -2.3$$

$$z = \frac{-84}{-15} = 5.6$$

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ACMA 400C

2a

$$I \quad Z_1 + Z_2$$

$$Z_1 = 1 + 7j$$

$$Z_2 = 2 - 5j$$

$$= 3 + 2j$$

$$II \quad Z_1 - Z_3$$

$$Z_1 = 1 + 7j$$

$$Z_3 = -2 + 3j$$

$$= -1 + 4j$$

$$III \quad Z_1 = Z_1 = 1 + 7j$$

$$Z_2 \quad Z_2 = 2 - 5j$$

$$\frac{1+7j}{2-5j} \times \frac{2-5j}{2-5j}$$

$$= \frac{(1+7j)(2-5j)}{(2-5j)(2-5j)}$$

$$= \frac{(2-5j) + 7j(2-5j)^2}{4-10j-10j+25j^2}$$

$$= \frac{2+9j-35j^2}{4-20j+25j^2}$$

$$= \frac{-33+9j}{29-20j}$$

$$= \frac{-33+9j}{29-20j}$$

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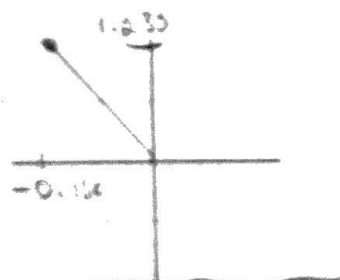
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ACMA0006

$$\begin{aligned}
 b \quad 11x^2 + 3x &= -17 \\
 11x^2 + 3x + 17 &= 0 \\
 x &= \frac{-3 \pm \sqrt{3^2 - 4 \times 11 \times 17}}{2 \times 11} \\
 &= \frac{-3 \pm \sqrt{9 - 748}}{22} \\
 &= \frac{-3 \pm \sqrt{-739}}{22}
 \end{aligned}$$

$$\frac{-3 + j27.18}{22}$$

$$-0.136 + j1.235j$$



$$r = \sqrt{0.136^2 + 1.235^2}$$

$$= 1.242$$

$$\theta = \tan^{-1}\left(\frac{1.235}{-0.136}\right)$$

$$= -83.72$$

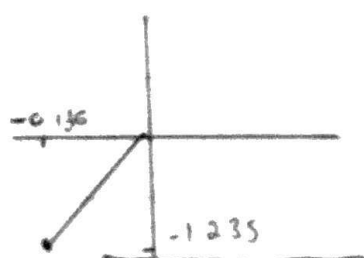
$$\theta = 180 - 83.72$$

$$= 96.28$$

$$\therefore 1.242 (\cos 96.28 + j \sin 96.28)$$

$$\frac{-3 - j27.18}{22}$$

$$-0.136 - j1.235j$$



$$r = \sqrt{0.136^2 + 1.235^2}$$

$$= 1.242$$

$$\theta = \tan^{-1}\left(\frac{-1.235}{-0.136}\right)$$

$$= 83.72$$

$$\theta = 180 + 83.72$$

$$= 263.72$$

$$\therefore 1.242 (\cos 263.72 + j \sin 263.72)$$

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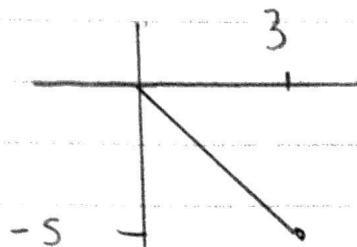
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ACMA4006

$$c(3-5j)^5$$



$$r = \sqrt{3^2 + 5^2}$$

$$= 5.83$$

$$\tan^{-1}\left(\frac{5}{3}\right)$$

$$= 59.04$$

$$\theta = 360 - 59.04$$

$$= 300.96$$

$$5.83^5 (\cos 5 \times 300.96 + j \sin 5 \times 300.96)$$

$$6735.08 (\cos 1504.8 + j \sin 1504.8)$$

$$6735.08 (0.43 + j 0.90)$$

$$2896.08 - 6061.57j$$

3a.

$$1. \int 3x^3 - 5x^2 + 3x - 10 dx$$

$$\frac{3x^4}{4} - \frac{5x^3}{3} + \frac{3x^2}{2} - 10x + c$$

$$11. \int (x+5)(x+3)(x-2) dx$$

$$(x^2 + 3x + 5x + 15)(x-2)$$

$$\int x^3 + 2x^2 + 3x^2 - 6x + 5x^2 - 10x + 15x - 30$$

$$\int x^3 + 8x^2 - x - 30$$

$$\int x^3 + 6x^2 - x + 30$$

$$\frac{x^4}{4} + \frac{6x^3}{3} - \frac{x^2}{2} - 30x + c$$

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ACMA 4006

$$\text{iii } \int 5 \sin 3x + \frac{1}{x} dx$$

$$5x - \frac{1}{3} \cos 3x + x^{-1} + C$$

$$- \frac{5}{3} \cos 3x + x^{-1} + C$$

$$\text{iv } \int_2^5 (3x+1)(6x+2) dx$$

$$\int_2^5 18x^2 + 6x + 6x + 3$$

$$\left[\frac{18x^3}{3} + \frac{6x^2}{2} + \frac{6x^2}{2} + 3x \right]$$

$$\left[\frac{18(5)^3}{3} + \frac{6(5)^2}{2} + \frac{6(5)^2}{2} + 3 \times 5 \right] - \left[\frac{18(2)^3}{3} + \frac{6(2)^2}{2} + \frac{6(2)^2}{2} + 3 \times 2 \right]$$

$$\left[750 + 75 + 75 + 15 \right] - \left[48 + 12 + 12 + 6 \right]$$

$$915 - 78 = 837$$

$$\text{b } \begin{array}{l} \downarrow \frac{du}{dx} \\ \int 2x \sin 3x dx \end{array} \quad \begin{array}{ll} u = 2x & v = -\frac{1}{3} \cos 3x \\ \frac{du}{dx} = 2 & \frac{dv}{dx} = \sin 3x \end{array}$$

$$= uv - \int v \frac{du}{dx} dx$$

$$= 2x \left(-\frac{1}{3} \cos 3x \right) - \int -\frac{2}{3} \cos 3x (2)$$

$$= 2x \left(-\frac{1}{3} \cos 3x \right) + \frac{2}{3} \int \cos 3x (-)$$

$$= 2x \left(-\frac{1}{3} \cos 3x \right) + \frac{2}{3} + \frac{1}{3} \sin 3x$$

$$- \frac{2x \cos 3x}{3} + \frac{1}{3} \sin 3x + C$$