

Lewis Velours 2008201 Mathematics test 2

Q1

$$AB \begin{pmatrix} 2 & -5 & 3 \\ -5 & 0 & 5 \\ 3 & 0 & 2 \end{pmatrix} \begin{pmatrix} -5 & 8 & 0 \\ 2 & 6 & 2 \\ 0 & -2 & 3 \end{pmatrix}$$

$$\begin{array}{l} -10 -10 + 0 \quad -10 -20 + 0 \quad 16 + 30 - 6 \quad 0 + 10 + 9 \\ 25 + 0 + 0 \quad -40 + 0 - 10 \quad 0 + 0 + 15 \\ -15 + 0 + 0 \quad 24 + 0 - 4 \quad 0 + 0 + 6 \end{array}$$

$$= \begin{pmatrix} -20 & -20 & -1 \\ 25 & -50 & 15 \\ -15 & 20 & 6 \end{pmatrix}$$

$$BA \begin{pmatrix} -5 & 8 & 0 \\ 2 & 0 & 2 \\ 0 & -2 & 3 \end{pmatrix} \begin{pmatrix} 2 & -5 & 3 \\ -50 & 5 \\ 30 & 2 \end{pmatrix}$$

$$\begin{array}{l} -10 -40 + 0 \quad 25 + 0 + 0 \quad -15 + 40 + 0 \\ 4 + 0 + 6 \quad -100 + 0 + 10 \quad 6 + 0 + 4 \\ 0 + 10 + 10 \quad 0 + 10 + 0 \quad 0 + 6 + 6 \end{array}$$

$$= \begin{pmatrix} -56 & 25 & 25 \\ 10 & -10 & 10 \\ 19 & 0 & 0 \end{pmatrix}$$

$$AC \begin{pmatrix} 2 & -5 & 3 \\ -8 & 0 & 9 \\ 3 & 0 & 2 \end{pmatrix} \begin{pmatrix} 12.5 \\ -3 & 2 \\ 2 & 5 \end{pmatrix}$$

$$24 + 15 + 6 \quad 10 - 10 + 15$$

$$-66 + 0 + 10 \quad -25 + 0 + 25$$

$$36 + 0 + 4 \quad 15 + 0 + 10$$

$$= \begin{pmatrix} 45 & 15 \\ -56 & 0 \\ 34 & 35 \end{pmatrix}$$

CA = Can't do it

$$|A| \quad 2(0+0) + 5(-10+15) + 3(0+0)$$

$$= 30$$

$$|B| \quad -9(18+4) - 8(6+0) + 0(0+4)$$

$$= -70 - 48 + 0$$

$$= -118$$

$$A+B \begin{pmatrix} -3 & 3 & 3 \\ -3 & 6 & 7 \\ 3 & -2 & 5 \end{pmatrix}$$

$$AB+D$$

= can't add

$$6) 2(x + (x+2)) - 2x(x+2) - 2(5x+10+2x)$$

$$2(x^2 + 2x) - 2x(x+2) - 2(5x+10+2x)$$

$$2x^2 - 2x^2 - 4x - 34$$

$$4x^2 - 14x - 34$$

$$c) \begin{pmatrix} 3 & -1 & 4 \\ 5 & 3 & -1 \\ 2 & 4 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} \begin{pmatrix} 21 \\ 15 \\ 10 \end{pmatrix}$$

$$1A) 3(9x-4) + 1(15-2) + 4(20+6)$$

$$18x - 12 + 13 - 2 + 84$$

$$= 132$$

$$A_1 \begin{pmatrix} 21 & -1 & 4 \\ 15 & 3 & -1 \\ 10 & 4 & 3 \end{pmatrix}$$

$$21(6x-4) + 1(45+10) + 4(60+30)$$

$$126x - 84 + 55 + 360$$

$$= 457$$

$$A_2 \begin{pmatrix} 21 & 4 \\ 15 & -1 \\ 10 & 3 \end{pmatrix}$$

$$3(30-10) - 21(15-2) + 4(50+30)$$

$$60 - 273 + 320$$

$$= 107$$

$$A_3 \begin{array}{r} 3 \\ 3 \\ 2 \end{array} \begin{array}{r} -1 \\ 3 \\ 4 \end{array} \begin{array}{r} 21 \\ 15 \\ 10 \end{array}$$

$$3(30+60) + 1(50+30) + 21(20+6)$$

$$\begin{array}{r} 270 \\ + 80 \\ \hline = 896 \end{array}$$

$$\begin{array}{r} A_1 \\ \hline A_2 \\ \hline A_3 \\ \hline \end{array}$$

$$\begin{array}{r} 452 \\ \hline 132 \\ \hline 107 \\ \hline 132 \\ \hline 896 \\ \hline 132 \end{array}$$

$$A_3 \quad 3 \quad -1 \quad 21$$

$$S \quad 3 \quad 15$$

$$2 \quad 4 \quad 10$$

$$3(30+60) + 1(50+30) + 21(20+6)$$

$$270 \quad 80 \quad 546$$

$$= 896$$

$$A_1 \quad A_2 \quad A_3$$

$$\frac{(A_1)}{(A_1)} \quad \frac{(A_2)}{(A_1)} \quad \frac{(A_3)}{(A_1)}$$

$$\frac{452}{132}$$

$$\frac{107}{132}$$

$$\frac{896}{132}$$

$$= 3.46 \quad = 0.81 \quad = 6.78$$

Q2

$$i) = -3 + 3j$$

$$ii) = 2 + 2j$$

$$iii) \frac{2 + 5j}{1 - 3j} \times \frac{1 + 3j}{1 + 3j}$$

$$\frac{2 + 6j + 5j + 15j^2}{1 + 3j - 3j - 9j^2} = \frac{2 + 11j - 15}{10} = \frac{-13 + 11j}{10}$$

$$\frac{-13 + 11j}{10}$$

$$= \frac{-13}{10} + \frac{11j}{10}$$

$$iv) (23)^2 - 2$$

$$(-5 - 2j)(-5 - 2j) - 2 - 5j$$

$$25 + 10j + 10j + 4j^2 - 2 - 5j$$

$$227 = 19 + 15j$$

$$6) \quad s^2 c^2 = -3s^2 - 12$$

$$s^2 c^2 + 3s^2 + 12 = 0$$

$$\Rightarrow \sqrt{s^2 - 4(s)(12)}$$

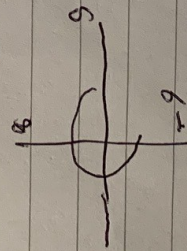
$$\frac{(s)2}{-3 \pm \sqrt{9 - 240}}$$

$$\frac{-3 \pm \sqrt{-231}}{10}$$

$$\frac{-3 \pm \sqrt{15.19}}{10} = \frac{-3}{10} \pm \frac{15.19}{10}$$

$$= 0.02$$

$$i) (s-9) \int \frac{5}{s^2 + 5^2}$$



$$r = 10.29$$

$$\theta = 80.94^\circ$$

$$\theta = 240.94^\circ$$

$$\theta = 380.299.06$$

$$50.45 (\cos 60.94 + j \sin 60.94)$$

$$304.7 \quad 304.7$$

$$51.45 \quad 0.87$$

$$= 24.99 \quad = 44.97$$

e) -g

Q3

$$i) (x^8 + 2x^2)(3x^2 + x) dx$$

$$3x^{10} + x^9 + 6x^4 + 2x^3$$

$$= \frac{3x^{11}}{11} + \frac{x^{10}}{10} + \frac{6x^5}{5} + \frac{2x^4}{4} + C$$

$$ii) (e^x + 1)(e^x - 1) dx$$

$$e^{2x} - e^x + e^x - 1$$

$$\frac{1}{2} e^{2x} - \frac{1}{2} e^x + \frac{1}{2} e^x - x + C$$

$$iii) \int_2^9 (x+2)^3 + x - 1 dx$$

$$(x+2)(x+2)(x+2)(x+2) dx$$

$$x^2 + 2x + 2x + 4 (x+2)$$

$$x^2 + 4x + 4 (x+2)$$

$$x^3 + 2x^2 + 4x^2 + 8x + 4x + 8$$

$$\int_2^9 x^3 + 6x^2 + 12x + 8 dx$$

$$\frac{x^4}{4} + \frac{6x^3}{3} + \frac{12x^2}{2} + 8x$$

$$156.25 + 250 + 150 + 40$$

$$= 596.25$$

$$4 + 16 + 24 + 16 = 60$$

$$b) \int x \sin kx \, dx$$

$$u \quad \frac{dv}{dx} \quad v \quad \frac{du}{dx}$$

$$u = x \quad v = -\frac{1}{k} \cos kx$$

$$(x) \cdot \left(-\frac{1}{k} \cos kx\right) - \int \left(-\frac{1}{k} \cos kx\right) dx$$

$$= -\frac{1}{k} x \cos kx + \frac{1}{k^2} \sin kx + C$$