$$A_2 = \begin{pmatrix} 2 & 14 & 2 \\ 1 & 4 & 5 \\ 3 & 9 & -2 \end{pmatrix}$$

$|A_2| = 2(-8-45) - 14(-2+15) + 2(9-12)$

$= -82$

$$A_3 = \begin{pmatrix} 2 & 3 & 14 \\ 1 & 2 & 4 \\ 3 & 1 & 19 \end{pmatrix}$$

$|A_3| = 2(38-4) - 3(19-12) + 14(1+6)$

$= 145$

$$x = \frac{|A_1|}{|A|} = \frac{-315}{5} = -63$$

$$y = \frac{|A_2|}{|A|} = \frac{-82}{5} = -16.4$$

$$z = \frac{|A_3|}{|A|} = \frac{145}{5} = 29$$

12:00, 6/01/2021, ACHA4000, 1803210

Question 1

ai) $-16 + -2 + 0$ $\quad 63 + -5 + -64$ $\quad 4 + -2 + 7$

$10 + 4 + 0$ $\quad -40 + 10 + -45$ $\quad -2.5 + 10 + 5$

$-6 + 0 + 0$ $\quad 24 + 0 + -18$ $\quad 1.5 + 0 + 2$

$$AB = \begin{pmatrix} -18 & -6 & 9 \\ 14 & -75 & 12.5 \\ -6 & 6 & 3.5 \end{pmatrix}$$

aii) $-16 + -40 + 1.5$ $\quad 2 + 16 + 0$ $\quad -14 + 40 + 1$

$16 + -25 + 6$ $\quad -2 + 10 + 0$ $\quad 17 + 25 + 4$

$0 + 45 + 3$ $\quad 0 + -18 + 0$ $\quad 0 + -45 + 2$

$$AB = \begin{pmatrix} -54.5 & 18 & 27 \\ -3 & 8 & 46 \\ 48 & -18 & -43 \end{pmatrix}$$

aiii) $16 + 6 + 7$ $\quad 16 + 0 + 84$

$-10 + -18 + 5$ $\quad -25 + 0 + 60$

$6 + 0 + 2$ $\quad 15 + 0 + 24$

$$AC = \begin{pmatrix} 29 & 100 \\ -23 & 35 \\ 8 & 39 \end{pmatrix}$$

aiv) $\int_2^4 (2x+3)(x+5)\,dx$

$\int_2^4 (2x^2+13x+15)\,dx$

$= \left[\frac{2x^3}{3} + \frac{13x^2}{2} + 15x + c\right]_2^4$

$= \left[\frac{2\times 4^3}{3} + \frac{13\times 4^2}{2} + (15\times 4) + c\right] - \left[\frac{2\times 2^3}{3} + \frac{13\times 2^2}{2} + (15\times 2) + c\right]$

$= 128.67 - 61.33$

$= 67.34$

bi) $\int 4x \cos 3x\,dx =$

$4x(\sin 3x) + c$

$4x\left(\frac{1}{3}\sin 3x\right) + c$

aiii) $\int_0^2 (3x^3 + 2x)^3 + 4x + 3\,dx$

$\int_0^2 (3x^3 + 2x)(3x^3 + 2x)(3x^3 + 2x) + 4x + 3\,dx$

$\int_0^2 (9x^6 + 6x^4 + 6x^4 + 4x^2)(3x^3 + 2x) + 4x + 3\,dx$

$\int_0^2 27x^9 + 18x^7 + 18x^7 + 12x^5 + 18x^7 + 12x^5 + 12x^5 + 8x^3 + 4x + 3\,dx$

$\int_0^2 27x^9 + 54x^7 + 36x^5 + 8x^3 + 4x + 3 + C$

$$\left[\frac{27}{10}x^{10} + \frac{54}{8}x^8 + \frac{36}{6}x^6 + \frac{8}{4}x^4 + \frac{4}{2}x^2 + (3x) + C\right]$$

$-[0 + C]$

$= 4248.267$

Question 3

ai) $\int (x^5 - 2x)(5x^3 + 6x)\,dx$

$= \int (5x^8 + 6x^6 - 10x^4 - 12x^2)\,dx$

$= \frac{5x^9}{9} + \frac{6x^7}{7} - \frac{10x^5}{5} - \frac{12x^3}{3} + C$

$= \frac{5}{9}x^9 + \frac{6}{7}x^7 - 2x^5 - 4x^3 + C$

aii) $\int (e^{5x} + 1)(e^{3x} + 2)\,dx$

$= \int (e^{8x} + 2e^{5x} + e^{3x} + 2)\,dx$

$= \frac{1}{8}e^{8x} + \frac{2}{5}e^{5x} + \frac{1}{3}e^{3x} + 2x^1 + C$

aviii) $AB = \begin{pmatrix} -18 & -6 & 9 \\ 14 & -75 & 12.5 \\ 6 & 6 & 3.5 \end{pmatrix}$ $D = \begin{pmatrix} 8 & 14 \\ 0.25 & 21 \end{pmatrix}$

I can not add the matrices because they are not the same ~~matrix~~ size. AB is a 3x3 matrix and D is a 2x2 matrix.

D)

$$\begin{pmatrix} 2 & 3 & 2 \\ 1 & 2 & 5 \\ 3 & 1 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 14 \\ 9 \\ 19 \end{pmatrix}$$

(A)

$|A| = 2 \times [(2 \times 2) - (1 \times 5)] - 3[(1 \times -2) - (5 \times 3)] + 2[(1 \times 1) - (5 \times 3)]$

$= 2 \times [-4 - 5] - 3[-2 - 15] + 2[1 - 15]$

$= (2 \times -9) - (3 \times -17) + (2 \times -14)$

$= 5$

$A_1 = \begin{pmatrix} 14 & 3 & 2 \\ 4 & 2 & 5 \\ 19 & 1 & -2 \end{pmatrix}$

$|A_1| = 14(-4+5) - 3(-8+95) + 2(4-38)$

$= 14 - 261 - 68$

$= -315$

bii) $\int_1^2 3xe^{2x}\,dx$

$= \left[\frac{3x^2}{2} \times \frac{1}{2} e^{2x} + C\right]_1^2$

$\left[\frac{3 \times 2^2}{2} \times \frac{1}{2} e^{2 \times 2} + C\right] - \left[\frac{3 \times 1^2}{2} \times \frac{1}{2} e^{2 \times 1} + C\right]$

$81.89723 - 5.54179 = 76.3554$

ci) $\int \frac{21x^2 + 10x - 3}{7x^3 + 5x^2 + 3x - 1}\,dx$

$\frac{\frac{21x^3}{3} + \frac{10x^2}{2} - 3x}{\frac{7x^4}{4} + \frac{5x^3}{3} - \frac{3x^2}{2} - x} + C$

$\frac{7x^3 + 5x^2 - 3x}{\frac{7}{4}x^4 + \frac{5}{3}x^3 - \frac{3}{2}x^2 - x} + C$

c ii) $\int \frac{8}{3x+10} \, dx$

$\frac{8x}{\frac{3x^2}{2}+10x} + C$

$\frac{8x}{\frac{3}{2}x^2+10x} + C$

d) $\int_{\frac{\pi}{5}}^{\frac{\pi}{2}} \frac{7}{9} \sin x \cos x$

$u = \sin x$

$\frac{dw}{dx} = \cos x$

$\frac{dw}{\cos x} = dx$

$\int_{\frac{\pi}{5}}^{\frac{\pi}{2}} \frac{7}{9} u \cos x \, du$

$\int_{\frac{\pi}{5}}^{\frac{\pi}{2}} \frac{7}{9} u(1-u^2) \, du$

av) $|A| = 8[(2\times2)-(0\times5)]-(-1)[(-5\times2)-(5\times3)]+7[(-5\times0)-(2\times3)] =$

$[8\times(4-0)]-[(-1)\times(-10-15)]+[7\times(0-6)] =$

$32-(-25)-42 = 15$

aiv) Can not be multiplied because C has 2 columns. C is a $3\times\underline{2}$ matrix and A is $\underline{3}\times2$ so 2 and 3 are not equal.

avi) $|B| = -2[(5\times1)-(-9\times2)]-8[(2\times1)-(2\times0)]+0.5[(2\times-9)-(5\times0)] =$

$= -2\times(5--18)-(8\times4)+(0.5\times-18)$

$= (-2\times23)-(8\times4)+(0.5\times-18)$

$= -87$

avii) $A+B = \begin{pmatrix} 6 & 7 & 7.5 \\ -3 & 7 & 7 \\ 3 & -9 & 3 \end{pmatrix}$

$$\int_{\frac{\pi}{5}}^{\frac{\pi}{2}} \frac{7}{9} u - u^3 \, du$$

$$= \left[\frac{\frac{7}{9} u^2}{2} - \frac{u^4}{4} + c \right]_{\frac{\pi}{5}}^{\frac{\pi}{2}} du$$

$$= \left[\frac{\frac{7}{9} \sin^2}{2} - \frac{\sin^4}{4} + c \right]_{\frac{\pi}{5}}^{\frac{\pi}{2}} du$$