

matric no: 801 and above:
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matric no: 19/mtt501/409

Assignment from Friday class (01/05/2020)

$$1. \int \frac{11-3x}{x^2+2x-3}$$

$$\frac{11-3x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1}$$

multiply thru by $(x+3)(x-1)$

$$11-3x = A(x-1) + B(x+3)$$

$$\text{bring } x = -3 \text{ \& } x = +1$$

$$f(-3) \rightarrow 11-3(-3) = A(-3-1)$$

$$11+9 = A(-4)$$

$$20 = -4A$$

$$A = -5$$

$$f(1) \rightarrow 11-3(1) = B(1+3)$$

$$11-3 = 4B$$

$$8 = 4B$$

$$B = 2$$

$$\rightarrow \frac{11-3x}{(x+3)(x-1)} = \frac{-5}{x+3} + \frac{2}{x-1}$$

$$-5 \int \frac{dx}{x+3} + 2 \int \frac{dx}{x-1} = \int \frac{11-3x}{x^2+2x-3}$$

$$\text{let } u = x+3$$

$$du = dx$$

$$\rightarrow -5 \int \frac{du}{u}$$

$$\rightarrow -5 \ln u$$

$$-5 \ln(x+3)$$

$$\rightarrow -5 \ln(x+3) + 2 \ln(x-1)$$

OR

$$2 \ln(x-1) - 5 \ln(x+3)$$

$$\int \frac{4x-16}{x^2-2x}$$

$$\frac{4x-16}{2(x-2)} = \frac{A}{x} + \frac{B}{x-2}$$
$$= \frac{A(x-2) + Bx}{x(x-2)}$$

$$\rightarrow A(x-2) + Bx = 4x-16$$

$$Ax - 2A + Bx = 4x - 16$$

$$\rightarrow Ax + Bx - 2A = 4x - 16$$

$$\rightarrow (A+B)x - 2A = 4x - 16$$

$$\rightarrow A+B = 4 \quad \text{--- (i) } \times 2$$

$$\quad \quad \quad -2A = -16 \quad \text{--- (ii) } \times 1$$

$$\quad \quad \quad 2A + 2B = 8 \quad \text{--- (iii)}$$

$$+ \quad -2A \quad \quad = -16 \quad \text{--- (iv)}$$

$$2B = -8$$

$$B = -4$$

Also from eq (i)

$$A+B = 4$$

$$A = 4 - B$$

$$A = 4 - (-4)$$

$$A = 8$$

$$\rightarrow 8 \int \frac{dx}{x} + -4 \int \frac{dx}{x-2} = \int \frac{4x-16}{x^2-2x} dx$$

$$\text{Let } u = x \quad u = x-2$$

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

$$\rightarrow 8 \int \frac{du}{u} \quad 4 \int \frac{du}{u}$$

$$8 \ln u \quad 4 \ln u$$

$$\rightarrow 8 \ln(x) - 4 \ln(x-2)$$

$$\Rightarrow \frac{4x-16}{x^2-2x} = 8 \ln(x) - 4 \ln(x-2)$$

$$3. \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)}$$

$$\rightarrow \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x+3}$$

multiply thru by $(x+1)(x-2)(x+3)$

$$2x^2 - 9x - 35 = A(x+3)(x-2) + B(x+1)(x+3) + C(x+1)(x-2)$$

using $x = -1$ or $x = 2$ or $x = -3$

$$f(-1) = 2(-1)^2 - 9(-1) - 35 = A(-1+3)(-1-2)$$

$$2 + 9 - 35 = A(2)(-3)$$

$$-24 = -6A$$

$$A = 4$$

$$f(2) = 2(2)^2 - 9(2) - 35 = B(2+1)(2+3)$$

$$8 - 18 - 35 = B(3)(5)$$

$$-45 = 15B$$

$$B = -3$$

$$f(-3) \rightarrow 2(-3)^2 - 9(-3) - 35 = C(-3+1)(-3-2)$$

$$18 + 27 - 35 = C(-2)(-5)$$

$$10 = 10C$$

$$C = 1$$

$$\rightarrow 4 \int \frac{dx}{x+1} - 3 \int \frac{dx}{x-2} + \int \frac{dx}{x+3} = \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx$$

$$\text{let } u = x+1$$

$$du = dx$$

$$\rightarrow 4 \int \frac{1}{u}$$

$$4 \ln(x+1)$$

$$\text{let } u = x-2$$

$$du = dx$$

$$\rightarrow -3 \int \frac{1}{u}$$

$$\rightarrow -3 \ln(x-2)$$

$$\text{let } u = x+3$$

$$du = dx$$

$$\rightarrow \int \frac{1}{u}$$

$$= \ln(x+3)$$

$$\rightarrow 4 \ln(x+1) - 3 \ln(x-2) + \ln(x+3)$$