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Section: MAS/MBS

Course: MAT 104

19/MH301/018

1.] 11-3x Number 1

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

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

From the denominator

$$x^2 + 2x - 3 = 0$$

$$x^2 + 3x - x - 3 = 0$$

$$x(x+3) - 1(x+3) = 0$$

$$(x-1)(x+3) = 0$$

$$\int \frac{11-3x}{(x-1)(x+3)} dx = \int \frac{11-3x}{(x-1)(x+3)} dx$$

Following the partial fraction

$$11-3x = A + B$$

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

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

$$11-3x = Ax + 3A + Bx - B$$

Equating the above

$$11-3x = Ax + 3A + Bx - B$$

$$2A + B = 11$$

$$-3A + B = -3$$

$$B = 4$$

$$A = -3$$

$$\frac{11-3x}{(x-1)(x+3)} = \frac{-3}{x-1} + \frac{4}{x+3}$$

$$11-3x = -3(x-1) + 4(x+3)$$

$$20 = -4A$$

$$A = -5$$

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

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

$$= \int \frac{A}{x-1} dx + \int \frac{B}{x+3} dx$$

$$= A \int \frac{1}{x-1} dx + B \int \frac{1}{x+3} dx$$

$$= A \ln|x-1| + B \ln|x+3| + C$$

Number 2

$$[2] \int \frac{4x-16}{x^2-2x-3} dx$$

From the denominator

$$x^2 - 2x - 3 = 0$$

$$x^2 - 3x + x - 3 = 0$$

$$x(x-3) + 1(x-3) = 0$$

$$(x-3)(x+1) = 0$$

$$\int \frac{4x-16}{(x-3)(x+1)} dx = \int \frac{4x-16}{(x-3)(x+1)} dx$$

Following the partial fraction

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

$$4x-16 = A(x+1) + B(x-3)$$

$$4x-16 = Ax + A + Bx - 3B$$

$$4x-16 = Ax + A + Bx - 3B$$

$$4x-16 = Ax + A + Bx - 3B$$

Equating the above

$$4x-16 = A(x+1) + B(x-3)$$

$$10 = 4A$$

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$4x-12 = 16$ and

$4x-12 = 16 \Rightarrow A(x-17) + B(x-11) \Rightarrow$

$-20x = -4B$

$B = 5$

$4x-16 = -1 + 5$

(2)

$\int \frac{4x-16}{(x-17)(x-11)} dx = \int \left(\frac{-1}{(x-17)} + \frac{5}{(x-11)} \right) dx$

$= \int \frac{-1}{(x-17)} dx + \int \frac{5}{(x-11)} dx$

$= -1 \int \frac{1}{(x-17)} dx + 5 \int \frac{1}{(x-11)} dx$

$\Rightarrow -1 \ln|x-17| + 5 \ln|x-11|$

Number 3

8.]

$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x-5)} dx$

Resolving into partial fractions

$2x^2 - 9x - 35 = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x-5}$

Equating numerators

$2x^2 - 9x - 35 = A(x-2)(x-5) + B(x+1)(x-5) + C(x+1)(x-2)$

Put $x = 2$

$-45 = 15B$

$B = -3$

Put $x = 5$

$-14 = -6A$

$A = \frac{7}{3}$

Put $x = -1$

Number 3

(5)

$10 = 10c$

$c = 1$

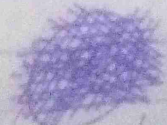
$\therefore 2x^2 - 9x - 35 = -3 + 1 + 1$

$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x-5)} dx = \int \left(\frac{7}{3(x+1)} - \frac{3}{x-2} + \frac{1}{x-5} \right) dx$

$= \int \frac{7}{3(x+1)} dx - \int \frac{3}{x-2} dx + \int \frac{1}{x-5} dx$

$= \frac{7}{3} \int \frac{1}{x+1} dx - 3 \int \frac{1}{x-2} dx + \int \frac{1}{x-5} dx$

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$\Rightarrow \frac{7}{3} \ln|x+1| - 3 \ln|x-2| + \ln|x-5|$