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 19/MTS01/308 - MBBS
 MAT1104 Assignment

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

$\frac{11-3x}{x^2+2x-3} = \frac{11-3x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1}$
 Multiply through by $(x+3)(x-1)$

$11-3x = A(x-1) + B(x+3)$
 When $x-1=0$, $x=1$ → put into eqn (1)
 $f(1) = 11-3(1) = A(1-1) + B(1+3)$

$8 = \frac{4B}{4}$

$B = 2$

When $x+3=0$, $x=-3$ → put into eqn (1)

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

$20 = -4A + 0$
 $A = -\frac{20}{4} = -5$

$A = -\frac{1}{2}$

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

$= \int \frac{2}{x-1} - \int \frac{1/2}{x+3}$

$= 2 \ln|x-1| - \frac{1}{2} \ln|x+3|$

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

$$= \frac{4x-16}{x^2-2x-3} = \frac{4x-16}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

Multiplying through by $(x-3)(x+1)$

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

When $x+1=0$, $x=-1$ — put into eqn(i)

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

$$-4 - 16 = -4B$$

$$B = 5$$

When $x-3=0$, $x=3$ — put into eqn(i)

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

$$12 - 16 = 4A$$

$$A = -1$$

$$\therefore \int \frac{4x-16}{x^2-2x-3} dx = \int \frac{5}{x-3} - \frac{1}{x+1} dx$$

$$= 5 \ln|x-3| - \ln|x+1| + C$$

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

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

Multiplying through by $(x+1)(x-2)(x+3)$

$$2x^2 - 9x - 35 = A(x-2)(x+3) + B(x+1)(x+3) + C(x+1)(x-2) \quad \text{--- (i)}$$

$$+ C(x+1)(x-2) \quad \text{--- (ii)}$$

When $x-2=0$, $x=2$ - input to eqn (i)

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

$$+ C(2+1)(2-2)$$

$$8 - 18 - 35 = A(0) + B(15) + C(0)$$

$$8 - 18 - 35 = 15B$$

$$-45 = 15B$$

$$B = -3$$

When $x+3=0$, $x=-3$ - input to eqn (i)

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

$$+ C(-3+1)(-3-2)$$

$$18 + 27 - 35 = A(0) + B(0) + C(-2 \times -6)$$

$$10 = C(12)$$

$$10 = 12C$$

$$\frac{10}{12} = C$$

$$C = \frac{5}{6}$$

Wahen $2x \neq 1 = 0$, $2x = -1$ - parting eqn (1)

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

$$+ C[(-1+1)(-1-2)]$$

$$2 - 9 - 35 = A[-3 \times 2] + B[0] + C[0]$$

$$-42 = -6A$$

$$-6A = -42$$

$$A = 7$$

$$A = 7 //$$

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

$$= \int \frac{7}{x+1} - \frac{3}{x-2} + \frac{5/6}{x+3}$$

$$= \int \frac{7}{x+1} - \frac{3}{x-2} + \frac{5/6}{x+3}$$

$$= 7 \ln(x+1) - 3 \ln(x-2) + 5/6 \ln(x+3) //$$