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19/MHS01/025

MBBS

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

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

From the denominator,

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

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

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

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

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

Resolving  $\frac{11-3x}{(x-1)(x+3)}$  into partial fraction

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

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

$$\text{Put } x=1$$

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

$$8 = 4B$$

$$B = 2$$

$$\text{Put } x = -3$$

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

$$20 = -4A$$

$$A = -5$$

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

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

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

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

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

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

From the denominator,

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

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

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

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

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

Resolving  $\frac{4x-16}{(x-3)(x+1)}$  into partial fraction

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

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

$$\text{Put } x = 3$$

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

$$A = -1$$

$$\text{Put } x = -1$$

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

$$B = 5$$

$$7. \frac{4x-16}{(x-3)(x+1)} = \frac{-1}{(x-3)} + \frac{5}{(x+1)}$$

$$\int \left( \frac{4x-16}{(x-3)(x+1)} \right) dx = \int \left( \frac{-1}{(x-3)} + \frac{5}{(x+1)} \right) dx$$

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

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

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

$$8.2 \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)}$$

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

$$= A(x+2)(x+3) + B(x+1)(x+3) + C(x+1)(x+2)$$

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

Put  $x=2$

$$B = -3$$

Put  $x=-1$

$$A = 4$$

Put  $x=-3$

$$C = 1$$

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

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

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