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DEPARTMENT: MBBS

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

soln

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

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

At $x = -3$

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

$$-4B = 20$$

$$B = -5$$

At $x = 1$

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

$$4A = 8$$

$$A = 2$$

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

let $u = x-1$, let $u = x+3$

$$du/dx = 1 \quad du/dx = 1$$

$$du = dx \quad du = dx$$

$$= \int \frac{2du}{u} - \int \frac{5du}{u}$$

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

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

soln.

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

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

At $x = -1$

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

$$-4A = -20, A = 5$$

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

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

$$4B = -4$$

$$B = -1$$

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

$$u = x+1 \quad u = x-3$$

$$du/dx = 1 \quad du/dx = 1$$

$$du = dx \quad du = dx$$

$$\int \frac{5 du}{u} \quad \int \frac{du}{u}$$

$$5 \ln u - \ln u \Rightarrow \underline{5 \ln(x+1) - \ln(x-3) + C}$$

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

Soln.

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

$$(x+1)(x-2)(x+3) \quad (x+1) \quad (x-2) \quad (x+3)$$

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

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

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

$$-6A = -24$$

$$A = 4$$

$$\text{At } x = 2, B(2+1)(2+3) = -45$$

$$15B = -45, B = -3$$

$$\text{At } x = -3, C(-3+1)(-3-2) = 10$$

$$10C = 10, C = 1$$

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

$$4 \ln u - 3 \ln u + \ln u + C$$

$$\underline{4 \ln(x+1) - 3 \ln(x-2) + \ln(x+3) + C}$$