

# Assignment -10

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

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

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

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

To get B, let  $x = 2$

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

$$8 - 18 - 35 = A(0)(5) + B(3)(5) + C(3)(0)$$

$$-45 = 0 + 15B + 0$$

$$-45 = 15B$$

$$\frac{-45}{15} = B$$

$$\therefore B = -3$$

To get C, let  $x = -3$

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

$$18 + 27 - 35 = A(-5)(0) + B(-2)(0) + C(-2)(-5)$$

$$10 = 0 + 0 + 10C$$

$$10 = 10C$$

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

$$\therefore C = 1$$

Let  $x = 1$

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

$$2 - 9 - 35 = [A(-1)(4)] + [B(2)(4)] + [C(2)(-1)]$$

$$-42 = -4A + 8B + (-2C)$$

$$-42 = -4A + 8B - 2C$$

where  $B = -3$  and  $C = 1$

$$-42 = -4A + 8(-3) - 2(1)$$

$$-42 = -4A - 24 - 2$$

$$-42 = -4A - 26$$

$$-42 + 26 = -4A$$

$$-16 = -4A$$

$$\frac{-16}{-4} = A$$

$$A = 4$$

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

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

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

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

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

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

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