

1. Adegunju Ayomide Mercy

MBBS

19 | mtt501 | 026

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

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

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

multiply by $(x-1)(x+3)$

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

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

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

$$A = 2$$

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

$$20 = -4B$$

$$B = -5$$

$$A = 2, B = -5$$

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

$$\int \frac{11-3x}{x^2+2x-3} = 2 \ln|x-1| - 5 \ln|x+3| + C$$

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

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

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

multiply both sides by $(x+1)(x-3)$

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

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

$$-4A = -20$$

$$A = 5$$

$$f(3) = B(4) = -4$$

$$B = -1$$

$$\therefore A = 5, B = -1$$

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

$$u = x+1$$

$$u = x-3$$

$$\frac{du}{dx} = 1$$

$$\frac{du}{dx} = 1$$

$$\frac{5 \cdot du}{u}$$

$$\frac{-1 \cdot du}{u}$$

$$5 \ln u$$

$$= -1 \ln u$$

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

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

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

multiply both sides by $(x+1)(x-2)(x+3)$

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

$$\frac{A(x^2 + 3x - 2x - 6) + B(x^2 + 3x + x + 3) + C(x^2 - 2x + x - 2)}{(x+1)(x-2)(x+3)}$$

$$\frac{Ax^2 + Ax - 6A + Bx^2 + 4Bx + 3B + Cx^2 - Cx - 2C}{(x+1)(x-2)(x+3)}$$

$$\frac{x^2(A+B+C) + x(A+4B-C) + (-6A+3B-2C)}{(x+1)(x-2)(x+3)}$$

$$A + B + C = 2$$

$$A + 4B - C = -9$$

$$-6A + 3B - 2C = -35$$

$$A = 2 - B - C \quad \text{--- (4)}$$

put eqn 4 into 2 & 3

$$2 - B - C + 4B - C = -9$$

$$3B - 2C + 2 = -9$$

$$3B - 2C = -11 \quad \text{--- (5)}$$

$$-6A + 3B - 2C = -35$$

$$-6(2 - B - C) + 3B - 2C = -35$$

$$-12 + 6B + 6C + 3B - 2C = -35$$

$$-12 + 9B + 4C = -35$$

$$9B + 4C = -35 + 12$$

$$9B + 4C = -23 \quad \text{--- (6)}$$

$$3B - 2C = -11$$

$$9B + 4C = -23$$

multiply eqn (5) by 4 and eqn 6 by 2

$$12B - 8C = -44$$

$$18B + 8C = -46$$

$$30B \quad \quad \quad -90$$

$$B = \frac{-90}{30} = -3$$

$$-34 \quad \text{--- (7)}$$

put eqn (7) in 5

$$3B - 2C = -11$$

$$3(-3) - 2C = -11$$

$$-9 - 2C = -11$$

$$-2C = -11 + 9$$

$$-2C = -2$$

$$C = 1$$

put eqn 7 & 8 in eqn 1

$$A = 2 - B - C$$

$$A = 2 - (-3) - (1)$$

$$A = 4$$

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

19/11/2019

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

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