

OLAWUNYI ANNOLUWAPD  
CHRISTIANAH IQ/MH501/324

(1)

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

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

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

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

At  $x = -3$

$$6(-4) = 20$$

$$B = -5$$

At  $x = 1$

$$A(4) = 8$$

$$A = 2$$

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

Let  $u = x+3$   
 $du = dx$

$u = x-1$   
 $du = dx$

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

$$\int \frac{2 du}{u}$$

$$= -5 \ln u = 2 \ln u$$

$$= 2 \ln u - 5 \ln u$$

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

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

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

Sol

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

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

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

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

At  $x = -1$

$$B(-4) = -20$$

$$B = 5$$

At  $x = 3$

$$A(4) = -4$$

$$A = -1$$

$$\int \frac{-1}{x-3} dx + \int \frac{5}{x+1} dx = \int \frac{4}{x}$$

Let  $u = x-3$       $u = x+1$

$du = dx$

$du = dx$

$$\Rightarrow \int \frac{-1 du}{u}$$

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

$$= -\ln u$$

$$= 5 \ln u$$

$$\int \frac{4x-16}{x^2-2x-3} = 5 \ln(x+1) - \ln$$

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

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

Sol

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

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

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

-1  
)

$$= 11-3x$$

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

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

$$B(-4) = -20$$

$$B = 5$$

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

$$A = (4) = -4$$

$$A = -1$$

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

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

$$\frac{c-1}{dx}$$

$$\text{Let } u = x-3 \quad u = x+1$$

$$du = dx$$

$$du = dx$$

$$\Rightarrow \int \frac{-1}{u} du$$

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

$$-\ln u$$

$$= 5 \ln u$$

$$2 \ln u$$

$$\int \frac{4x-16}{x^2-2x-3} = 5 \ln(x+1) - \ln(x-3)$$

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

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

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

Sol

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

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

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

$$2x^2 - 9x - 35 = A(x^2 + x - 6) + B(x^2 + 4x + 3) + C(x^2 - x - 2)$$

$$2x^2 - 9x - 35 = Ax^2 + Ax - 6A + Bx^2 + 4Bx + 3B + Cx^2 - Cx - 2C$$

$$2x^2 - 9x - 35 = Ax^2 + Bx^2 + Cx^2 + Ax + 4Bx - Cx - 6A + 3B - 2C$$

$$2x^2 - 9x - 35 = (A+B+C)x^2 + (A+4B-C)x - (6A-3B+2C)$$

$$A+B+C = 2 \quad \text{--- (1)}$$

$$A+4B-C = -9 \quad \text{--- (2)}$$

$$6A-3B+2C = 35 \quad \text{--- (3)}$$

$$\textcircled{2} - \textcircled{1}: \quad 3B - 2C = -11 \quad \text{--- (4)}$$

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

$$B = \frac{2C - 11}{3}$$

Putting  $B = \frac{2C - 11}{3}$  in (3)

$$6A - 3\left(\frac{2C - 11}{3}\right) + 2C = 35$$

$$6A - 2C + 11 + 2C = 35$$

$$6A + 11 = 35$$

$$6A = 24 \quad \therefore A = 4$$

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(H) on A in (1) & (2)

$$B + C = 2 \quad \text{--- (1)}$$

$$4B - C = -13 \quad \text{--- (2)}$$

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$$(1) + (2) : 5B = -15$$

$$B = -3$$

$$+ -3 \text{ in (1) in (2) : } -3 + C = -2$$

$$C = 1$$

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

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

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

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