

OHIOMOSA BRITELLE ISBOMA
MBBS

19/11/2021/303

$$= 2 \ln|x-1| - 5 \ln|x+3| \quad (\text{NO.1 Ans})$$

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

soln

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

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

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

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

At $x = -1$

$$A(-1-3) + 0(-1+1) = 4(-1) - 16$$

$$-4A + 0 = -20$$

$$-4A = -20$$

$$A = 5$$

At $x = 3$

$$0(3-3) + B(3+1) = 4(3) - 16$$

$$0 + 4B = -4$$

$$4B = -4$$

$$B = -1 ; A = 5, B = -1$$

Therefore;

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

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

Let $u = x+1$

$$du = dx$$

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

; Let $v = x-3$

$$= dv = dx$$

$$= -1 \int \frac{dv}{v} = -\ln v$$

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

Soln

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

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

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

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

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

$$A(1+3)+0(x-1) = 11-3(1)$$

$$4A = 8$$

$$A = 2$$

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

$$0 + B(-3-1) = 11-3(-3)$$

$$-4B = 20$$

$$-4B = 20$$

$$B = -\frac{5}{2}; \quad A = 2, \quad B = -\frac{5}{2}$$

Therefore,

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

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

$$\text{let } u = x-1$$

$$du = dx$$

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

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

$$= 2 \ln u$$

$$\text{; let } u = x-2$$

$$du = dx$$

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

$$= 5 \ln u$$

; Therefore $2 \ln u(x-1) - 5 \ln$

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NO 2 contd

$$\Rightarrow 5 \ln|x+1| - \ln|x-3| \text{ (NO 2. Ans)}$$

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

Soln

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

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

Multiply all by $(x+1)(x-2)(x+3)$

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

At $x = -1$

$$2(-1)^2 - 9(-1) - 35 = A(-3)(2) + B(0)(2) + C(0)(-3)$$
$$-24 = -6A$$

$$A = \frac{-24}{-6}$$

$$A = 4$$

At $x = 2$

$$2(2)^2 - 9(2) - 35 = A(0)(5) + B(3)(5) + C(3)(0)$$
$$-45 = 15B$$

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

$$B = -3$$

At $x = -3$

$$2(-3)^2 - 9(-3) - 35 = A(-5)(0) + B(-2)(0) + C(-2)(-5)$$
$$10 = 10C$$

$$C = \frac{10}{10} = 1$$

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Contd No. 3

$$A = 4, B = -3, C = 1$$

Therefore;

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

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

$$\text{let } u = x+1; \quad \text{let } u = x-2; \quad \text{let } u = x+3$$

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

$$= 4 \int \frac{du}{u} \quad = -3 \int \frac{du}{u} \quad = \int \frac{du}{u}$$

$$= 4 \ln u \quad = -3 \ln u \quad = \ln u$$

$$\Rightarrow 4 \ln |x+1| - 3 \ln |x-2| + \ln |x+3|$$