

NAME: UCIOCHUKWU CHIZITEREM PRECIOUS

MATRIC NUMBER: 19/MHS01/414

COLLEGE: MEDICINE AND HEALTH SCIENCES

DEPARTMENT: MEDICINE AND SURGERY

COURSE CODE: MATHS 104

TOPIC: INTEGRATION BY PARTIAL FRACTION.

(1)  $\int \frac{11-3x}{x^2+2x-3} dx$  (2)  $\int \frac{4x-16}{x^2-2x-3} dx$  (3)  $\int \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)} dx$

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

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

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

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

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

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

$$x=1 \text{ for } A$$

$$x=-3 \text{ for } B$$

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

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

$$11-3 = 4A$$

$$8 = 4A$$

$$A = 8/4 = 2$$

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

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

$$11+9 = B(-4)$$

$$20 = -4B$$

$$B = 20/-4 = -5$$

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

$$= \frac{A}{(2x-1)} + \frac{B}{(2x+3)} = \frac{2}{(2x-1)} + \frac{-5}{(2x+3)}$$

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

$$= 2 \ln|2x-1| - 5 \ln|2x+3| + C$$

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

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

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

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

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

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

$$x = -1 \text{ for } A$$

$$x = +3 \text{ for } B$$

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

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

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

$$-20 = -4A$$

$$A = -20/-4 = 5$$

$$A = 5$$

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

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

$$12-16 = B(4)$$

$$-4 = 4B$$

$$B = -4/4 = -1$$

$$B = -1$$

$$\frac{A}{x+1} + \frac{B}{x-3} = \frac{5}{(x+1)} + \frac{-1}{x-3}$$



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

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

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

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

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

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

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

$$35 = 6A - 3B + 2C \quad \dots (i)$$

$$x = 2 \text{ for } B$$

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

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

$$8 - 18 - 35 = B(3)(5)$$

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

$$B = -3 //$$

$$x = -3 \text{ for } C$$

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

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

$$10 = C(-2)(-5)$$

$$10 = 10C$$

$$C = 1 //$$

$$-35 = -6A - 9 - 2$$

$$-35 = -6A - 11$$

$$6A = 35 - 11$$

$$6A = 24$$

$$A = 24/6$$

$$A = 4 //$$

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

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

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

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

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

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