

ADEBAYO-OJO PRISCILLA OLAMIDE

191M15011023

MEDICINE AND SURGERY

MATHS: ASSIGNMENT

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

Solution:

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

$$x^2+3x-x-3$$

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

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

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

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

Multiply through by $(x-1)(x+3)$

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

When $x = -3$,

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

$$11+9 = A(0) + B(-4)$$

$$20 = -4b$$

$$-4b = 20$$

$$b = 20 / -4$$

$$b = -5$$

When $x = 1$

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

$$8 = 4a, a = 2$$

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

$$\int \left[\frac{2}{x-1} + \frac{-5}{x+3} \right] dx$$

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

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

$$x^2-2x-3$$

$$x^2+x-3x-3$$

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

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

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

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

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

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

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

when $x = -1$,

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

$$-20 = 0 - 4B$$

$$-20 = -4B$$

$$B = 5$$

when $x = +3$

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

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

$$12-16 = 4A + 0$$

$$-4 = 4A$$

$$4A = -4$$

$$A = -4/4$$

$$A = -1$$

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

$$\int \left(\frac{-1}{(x-3)} + \frac{5}{(x+1)} \right) dx$$

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

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

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

When $x = -2$

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

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

$$2x^2 - 9x - 35 = A(0)(1) + B(-1)(1) + C(0)(-1)$$

$$2(-2)^2 - 9(-2) - 35 = -B$$

$$2(4) + 18 - 35 = -B$$

$$8 + 18 - 35 = -B$$

$$-9 = -B$$

$$-B = -9$$

$$B = 9$$

When $x = -1$

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

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

$$2 + 9 - 35 = 2A$$

$$11 - 35 = 2A$$

$$-24 = 2A$$

$$2A = -24$$

$$A = -24/2$$

$$A = -12$$

When $x = -3$

$$2x^2 - 9x - 35 = A(x-3) + 27(x-3+3) + B(x-3+1) + C(x-3+3) + C(x-3+2) + C(x-3+1)$$

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

$$18 + 27 - 35 = 20$$

$$45 - 35 = 20$$

$$10 = 20$$

$$C = 5$$

$$\frac{2x^2 - 9x - 35}{(x+1)(x+2)(x+3)} = \frac{-12}{x+1} + \frac{9}{x+2} + \frac{5}{x+3}$$

$$\int \left(\frac{-12}{x+1} + \frac{9}{x+2} + \frac{5}{x+3} \right)$$

$$-12 \ln|x+1| + 9 \ln|x+2| + 5 \ln|x+3| + C$$