

OLUWALE OLUFEMI ADESOLA

19/MHS01/341

MBBS

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MAT 104

MBBS

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

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

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

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

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

At  $x=-3$ , we have

$$11+9 = B(-3-1)$$

$$20 = B(-4)$$

$$B = -5$$

At  $x=1$ , we have

$$11-3 = A(4)$$

$$8 = A(4)$$

$$A = 2$$

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

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

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

$$dx = du$$

$$\text{Let } u = x+3$$

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

$$dx = du$$

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

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

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

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

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

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

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

At  $x=-1$ , we have

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

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

$$B=5$$

At  $x=3$ , we have

$$-4 = A(4)$$

$$A=-1$$

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

$$\text{Let } u=x-3$$

$$\text{Let } u=x+1$$

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

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

$$dx=du$$

$$dx=du$$

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

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

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

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

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

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

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

When  $x = -1$

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

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

$$-42 = A(-6)$$

$$A = 7$$

When  $x = 2$

$$2(2)^2 - 9(2) - 35 = B(3)(5)$$

$$8 - 18 - 35 = B(15)$$

$$-45 = B(15)$$

$$B = -3$$

When  $x = -3$

$$2(-3)^2 - 9(-3) - 35 = C(-2)(-5)$$

$$18 + 27 - 35 = C(10)$$

$$10 = C(10)$$

$$C = 1$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx = \int \frac{7}{x+1} dx + \int \frac{-3}{x-2} dx + \int \frac{1}{x+3} dx$$

Let  $u = x+1$

Let  $u = x-2$

Let  $u = x+3$

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

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

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

$$du = dx$$

$$du = dx$$

$$du = dx$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx = 7 \int \frac{du}{u} - 3 \int \frac{du}{u} + \int \frac{du}{u}$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx = 7 \ln u - 3 \ln u + \ln u$$

$$\int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} dx = 7 \ln(x+1) - 3 \ln(x-2) + \ln(x+3)$$