

Agbogu David Iobechukwu
Maths 104 Assignment

19/MHS01/052

1)

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

Solu

$$x^2+2x-3 = (x-1)(x+3)$$

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

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

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

$$f(1) \Rightarrow 11-3(1) = A(1+3)$$

$$\frac{8}{4} = \frac{4A}{4}$$

$$A = 2$$

$$f(-3) \Rightarrow 11-3(-3) = B(-3-1)$$

$$\frac{20}{-4} = \frac{-4B}{-4}$$

$$B = -5$$

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

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

$$\int \frac{2}{x-1} dx \Rightarrow \int \frac{2}{u} \cdot du = 2 \int \frac{1}{u} du$$

$$2 \ln u = 2 \ln(x-1)$$

$$\int \frac{5}{x+3} dx \Rightarrow \int \frac{5}{u} \cdot du = 5 \int \frac{1}{u} du$$

$$-5 \ln u = -5 \ln(x+3)$$

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

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

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

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

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

Agbogu David To bechukwu
Maths 104 Assignment.

19/MH501/052

$$(2) \int \frac{4x+6}{x^2-2x-3} dx$$

Solu

$$x^2-2x-3 = (x-3)(x+1)$$

$$\frac{4x+6}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

$$\frac{4x+6}{(x-3)(x+1)} = \frac{A(x+1) + B(x-3)}{(x-3)(x+1)}$$

$$4x+6 = A(x+1) + B(x-3)$$

$$f(-1) \Rightarrow 4(-1)+6 = B(-1-3)$$

$$\frac{2}{-4} = \frac{-4B}{-4}$$

$$B = -\frac{1}{2}$$

$$f(3) \Rightarrow 4(3)+6 = A(3+1)$$

$$\frac{18}{4} = \frac{4A}{4}$$

$$A = \frac{9}{2}$$

$$\frac{4x+6}{(x-3)(x+1)} = \frac{9/2}{x-3} + \frac{-1/2}{x+1}$$

$$\int \frac{4x+6}{(x-3)(x+1)} dx = \int \frac{9/2}{x-3} dx - \int \frac{1/2}{x+1} dx$$

$$\int \frac{9/2}{x-3} dx \Rightarrow \int \frac{9/2}{u} du = \frac{9}{2} \int \frac{1}{u} du$$

$$\frac{9}{2} \ln u = \frac{9}{2} \ln(x-3)$$

$$-\int \frac{1/2}{x+1} dx \Rightarrow -\int \frac{1/2}{u} du = -\frac{1}{2} \int \frac{1}{u} du$$

$$-\frac{1}{2} \ln u = -\frac{1}{2} \ln(x+1)$$

$$\therefore \int \frac{4x+6}{(x-3)(x+1)} dx = \frac{9}{2} \ln(x-3) - \frac{1}{2} \ln(x+1)$$

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

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

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

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

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

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

Agbogu David — Tobechukwu

19/MITSO1/052
Maths 104 Assignment.

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

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

$$dx = du$$

Number 3 Continues

$$\int_{x+1}^4 \frac{dx}{x+1} = \int_{u}^4 \frac{1}{u} \cdot du \Rightarrow 4 \int \frac{1}{u} du$$

$$4 \ln u = 4 \ln(x+1)$$

$$\text{Let } u = x-2$$

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

$$dx = du$$

$$-\int \frac{3}{x-2} dx = -\int \frac{3}{u} \cdot du \Rightarrow -3 \int \frac{1}{u} du$$

$$-\frac{3 \ln u}{1} = -\frac{3 \ln(x-2)}{1} \quad -3 \ln u = -3 \ln(x-2)$$

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

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

$$dx = du$$

$$\int \frac{1}{x+3} dx = \int \frac{1}{u} \cdot du \Rightarrow \int \frac{1}{u} du$$

$$\ln u = \ln(x+3)$$

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