

Jatto Fadeelah Onize MAT 104 Assignment

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Course Code: MAT 104

Assignment

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

Solt.

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

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

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

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

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

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

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

$$8 = 0 + 4B$$

$$B = 2$$

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

$$11+9 = -4A + 0$$

$$20 = -4A$$

$$A = -5$$

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

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

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

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

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

$$\int \frac{2}{x-1} = \text{let } u = x-1$$
$$\frac{du}{dx} = 1$$
$$dx = du$$

$$= \int \frac{2}{u} du$$
$$= 2 \int \frac{1}{u} du$$
$$= 2 \ln|u|$$
$$= 2 \ln|x-1|$$

$$\int \frac{-5}{x+3} = \text{let } u = x+3$$
$$\frac{du}{dx} = 1$$

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

$$= -5 \int \frac{1}{u} du$$

$$= -5 \ln u$$

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

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

where C is the constant for integration

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

Solt

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

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

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

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

$$-4 = 4A + 0$$

$$A = -1$$

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

$$-20 = 0 - 4B$$

$$B = 5$$

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

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

$$\int \frac{-1}{x-3} dx = \text{let } a = x-3$$

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

$$dx = da$$

$$\int \frac{-1}{a} da$$

$$= -1 \int \frac{1}{a} da$$

$$= -1 \ln a$$

$$= -\ln(x-3)$$

$$\int \frac{5}{x+1} dx = \text{let } a = x+1$$

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

$$dx = da$$

$$\int \frac{5}{a} da$$

$$= 5 \int \frac{1}{a} da$$

$$= 5 \ln a$$

$$= 5 \ln(x+1)$$

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

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

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

Solt.

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

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

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

$$-24 = -6A + 0 + 0$$

$$A = 4$$

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

$$-45 = 0 + 15B + 0$$

$$B = -3$$

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

$$10 = 0 + 0 + 10C$$

$$C = 1$$

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

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

$$\int \frac{4}{x+1} = \text{let } b = x+1$$

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

$$dx = db$$

$$\int \frac{4}{b} db$$

$$= 4 \int \frac{1}{b} db$$

$$= 4 \ln b$$

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

$$\int \frac{-3}{x-2} = \text{Let } b = x-2$$

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

$$dx = db$$

$$\int \frac{-3}{b} db$$

$$= -3 \int \frac{1}{b} db$$

$$= -3 \ln b$$

$$= -3 \ln(x-2)$$

$$\int \frac{1}{x+3} \quad \text{Let } b = x+3$$

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

$$dx = db$$

$$= \int \frac{1}{b} db$$

$$= \ln b$$

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

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

