

EXPERIENSI ANITA OMOHNE

DEPT : AMBBS

MATRIC NO: 19/MITS01/149

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Assignment

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

2. $\int \frac{4x - 1}{x^2 - 2x - 3} dx$

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

Soln

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

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

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

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

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

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

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

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

$A + x = 1$, we have

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

$$B \cdot 4 = 8$$

$$B = 8/4 = 2$$

$$At \ x = -3$$

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

$$A(-4) = 20$$

$$A = \frac{20}{-4} = -5 //$$

we can now write

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

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

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

$$u = x-1$$

$$du = dx$$

$$du = dx$$

$$\Rightarrow \int \frac{-5 du}{u} + \int \frac{2 du}{u}$$

$$= -5 \ln u + 2 \ln u$$

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

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

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

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

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

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

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

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

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

At $x = -1$, we have

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

$$B(-4) = -4 - 16 = -20$$

$$B = \frac{-20}{-4} = 5$$

At $x = 3$, we have

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

$$4A = -2$$

$$A = \frac{-2}{4} = -\frac{1}{2}$$

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

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

$$\text{Let } u = x-3 \quad u = x+1$$

$$du = dx \quad du = dx$$

$$\Rightarrow \int \frac{-\frac{1}{2} du}{u} + \int \frac{5 du}{u}$$

$$= -\frac{1}{2} \ln u + 5 \ln u$$

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

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

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

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

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

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

At $x = 2$, we have

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

$$8 - 18 - 35 = A(0) + 15B + C(0)$$

$$15B = -45$$

$$B = \frac{-45}{15} = -3$$

At $x = -3$, we have

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

$$18 + 27 - 35 = A(0) + B(0) + 10C$$

$$10C = 10$$

$$C = \frac{10}{10} = 1$$

At $x = -1$, we have

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

$$C(-1+1)(-1-2)$$

$$2 + 9 - 35 = -6A + B(0) + C(0)$$

$$-6A = -24$$

$$A = \frac{-24}{-6} = 4$$

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

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

$$\text{Let } u = x+1 \quad u = x-2 \quad u = x+3$$

$$du = dx \quad du = dx \quad du = dx$$

$$= \int \frac{4 du}{u} + \int \frac{-3 du}{u} + \int \frac{1 du}{u}$$

$$= 4 \ln u - 3 \ln u + \ln u$$

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