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COLLEGE: MEDICINE & HEALTH SCIENCES

DEPARTMENT: MEDICINE & SURGERY

MAT 104 ASSIGNMENT

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

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

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

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

for  $f(1)$

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

$$11-3 = A(0) + 4B$$

$$8 = 4B$$

$$B = 2$$

$f(-3)$

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

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

$$20 = -4A$$

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

$$A = -5$$

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

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

for  $\int \frac{-5}{x+3} dx$

let  $u = x+3$   $\frac{du}{dx} = 1 \therefore du = dx$

$$\int \frac{-5}{u} dx = -5 \int \frac{1}{u} du = -5 \ln u = -5 \ln (x+3)$$

$$\int \frac{-5}{u} dx = -5 \ln (x+3)$$

$$\int \frac{2}{x-1} dx$$

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

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

$$du = dx$$

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

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

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

Solution

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

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

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

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

$f(3)$

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

$$12-16 = A(0) + 4B$$

$$-4 = 4B$$

$$B = \frac{-4}{4} = -1$$

$$B = -1$$

$f(-1)$

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

$$-4-16 = -4A + B(0)$$

$$-20 = -4A$$

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

$$A = 5$$

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

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

$$\int \frac{5}{x+1} dx$$

let  $u = x+1$   $\frac{du}{dx} = 1$   $\therefore du = dx$

$$\int \frac{5}{u} du = 5 \int \frac{1}{u} du = 5 \ln u = 5 \ln(x+1)$$

$$\int \frac{-1}{x-3} dx$$

let  $u = x-3$   $\frac{du}{dx} = 1$   $du = dx$

$$\int \frac{-1}{u} du = -1 \int \frac{1}{u} du = -1 \ln u = -\ln(x-3)$$

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

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

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

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

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

$f(2)$

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

$$8 - 18 - 35 = A(0)(5) + B(3)(5) + C(3)(0)$$

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

$$-45 = 15B$$

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

$$B = -3$$

$f(-1)$

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

$$-24 = A(-3)(2) + B(0)(-2) + C(0)(-3)$$

4

$$-24 = -6A$$

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

$$A = 4$$

$$f = -3$$

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

$$18 + 27 - 35 = A(-5)(0) + B(-2)(0) + C(-2)(-5)$$

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

$$10C = 10$$

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

$$C = 1$$

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

$$\text{let } u = x+1 \quad \frac{du}{dx} = 1 \Rightarrow du = dx$$

$$\int \frac{4}{u} du = 4 \int \frac{1}{u} du = 4 \ln u = 4 \ln(x+1)$$

$$\int \frac{-3}{x-2} dx$$

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

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

$$\int \frac{1}{x+3}$$

$$\text{let } u = x+3 \quad \frac{du}{dx} = 1 \therefore du = dx$$

$$\int \frac{1}{u} du = \ln u = \ln(x+3)$$

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