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COLLEGE: MEDICINE AND HEALTH SCIENCE

DEPARTMENT: MEDICINE AND SURGERY

MATRIC NO.: 19/MHS01/147

MAT 104 ASSIGNMENT

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

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

$$\swarrow \searrow$$

$$-3x^2+3x \text{ and } x$$

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

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

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

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

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

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

$$\text{At } x=1$$

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

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

$$4A=8$$

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

$$A=2$$

$$\text{At } x=-3$$

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

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

$$-4B=20$$

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

$$B=-5$$

we can now write

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

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

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

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

$$\therefore du = dx$$

$$\Rightarrow \int \frac{2 du}{u}$$

$$= 2 \ln u$$

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

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

$$du = dx$$

$$\Rightarrow \int \frac{5 du}{u}$$

$$5 \ln u$$

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

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

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

$$\swarrow -3 = -3 \text{ and } +1$$

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

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

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

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

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

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

$$\text{At } x = -1$$

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

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

$$-4A = -20$$

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

$$A = 5$$

$$\text{At } x=3$$

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

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

$$4B = -4$$

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

$$B = -1$$

we can now write

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

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

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

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

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

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

$$du = dx$$

$$dx = du$$

$$\Rightarrow \int \frac{5 du}{u}$$

$$\Rightarrow \int \frac{1 du}{u}$$

$$5 \ln u$$

$$\ln u$$

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

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

\Rightarrow

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

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

$$\text{At } x=2$$

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

$$A(0)(5) + B(3)(5) + C(3)(0) = 2(4) - 18 - 35$$

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

$$15B = -45$$

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

$$15$$

$$B = -3$$

$$\text{At } x=-1$$

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

$$A(-3)(2) + B(0)(2) + C(0)(-3) = 2 + 9 - 35$$

$$-6A = -24$$

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

$$A = 4$$

$$\text{At } x=-3$$

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

$$A(-5)(0) + B(-2)(0) + C(-2)(-5) = 2(9) + 27 - 35$$

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

$$10C = 10$$

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

$$10$$

$$C = 1$$

we can now write

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

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

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

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

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

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

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

$$du = dx$$

$$du = dx$$

$$du = dx$$

$$\int \frac{4 du}{u}$$
$$= 4 \ln u$$

$$\int \frac{3 du}{u}$$
$$= 3 \ln u$$

$$\int \frac{1 du}{u}$$
$$= \ln u$$

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