

Name: Oluoyole Boluwatife Emmanuel

Course: MAT 104

Dept: MBBS

Matric No: 19/MHS01/343

Assignment

① $\int \frac{11-3x}{x^2+2x-3} dx$, expressing x^2+2x-3 as a partial fraction

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

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

where $x+3=0$

$$x = -3$$

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

$$20 = 0 + (-4B)$$

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

$$-5 = B$$

$$B = -5$$

when $x-1=0$

$$x = 1$$

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

$$8 = 4A + 0$$

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

$$2 = A$$

$$A = 2$$

$$\therefore \frac{2}{x-1} + \frac{-5}{x+3}$$

$\int \frac{2}{x-1} dx + \int \frac{-5}{x+3} dx$, since $\int \frac{A}{ax+b} dx = \frac{A}{a} \ln(ax+b) + C$

we have $2 \ln(x-1) - 5 \ln(x+3) + C$

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

② $\int \frac{4x-16}{x^2-2x-3} dx$ Expressing $\frac{4x-16}{x^2-2x-3}$ as a partial fraction

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

multiply both sides by $(x-3)(x+1)$

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

when $x-3=0$

$$x=3$$

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

$$-4 = 4A$$

$$A = -1$$

when $x+1=0$

$$x=-1$$

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

$$-20 = -4B$$

$$B = 5$$

$$\therefore \frac{-1}{x-3} + \frac{5}{x+1}$$

$$\int \frac{-1}{x-3} dx + \int \frac{5}{x+1} dx$$

$$-1 \ln|x-3| + 5 \ln|x+1| + C$$

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

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

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

multiply both sides by $(x+1)(x-2)(x+3)$

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

when $x+1=0$

$$x = -1$$

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

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

$$-24 = -6A$$

$$A = 4$$

when $x-2=0$

$$x = 2$$

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

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

$$-45 = 15B$$

$$B = -3$$

when $x+3=0$

$$x = -3$$

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

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

$$10 = 10C$$

$$C = 1$$

$$\therefore \frac{4}{(x+1)} + \frac{-3}{(x-2)} + \frac{1}{(x+3)}$$

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

$$4 \ln|x+1| - 3 \ln|x-2| + 1 \ln|x+3| + C$$

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