

Oladapo Jimisola Emmanuel

Medicine and Surgery

19/MH501/329

MAT 104 (ASSIGNMENT)

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

Expressing  $\frac{11-3x}{x^2+2x-3}$  as partial fraction.

We have,

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

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

$$\text{Where } x+3=0$$

$$x=-3$$

Substitute  $x=-3$  into the equation

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

$$11+9 = 0 + 4B$$

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

$$B = -5$$

$$\text{When } x-1=0$$

$$x=1$$

Substitute  $x=1$  into the equation

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

$$11-3 = 4A + 0$$

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

$$A = 2$$

So we have the partial fraction

$$\text{to be } \frac{2}{x-1} + \frac{-5}{x+3}$$

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

$$\text{Since } \int \frac{1}{ax+b} dx = \frac{1}{a} \ln(ax+b) + C$$

We have,

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

We then have our final ans

$$\text{to be } 2 \ln(x-1) - 5 \ln(x+3)$$

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

$$2) \int \frac{4x+6}{x^2-2x-3}$$

Resolve  $\frac{4x+6}{x^2-2x-3}$  into partial fraction.

$$\frac{4x+6}{x^2-2x-3} = \frac{4x+6}{(x+1)(x-3)}$$

$$\text{We have, } \frac{4x+6}{(x+1)(x-3)} = \frac{A}{x+1} + \frac{B}{x-3}$$

$$4x+6 = A(x-3) + B(x+1)$$

$$\frac{4x+6}{(x+1)(x-3)} = \frac{A}{x+1} + \frac{B}{x-3}$$

$$4x+6 = A(x-3) + B(x+1)$$

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

$$4(3)+6 = A(3-3) + B(3+1)$$

$$\frac{18}{4} = \frac{4B}{4}$$



$$\frac{9}{2} = B$$

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

$$4(-1) + 6 = A(-1-3) + B(1+1)$$

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

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

So we have

$$\frac{-1}{2(x+1)} + \frac{9}{2(x-3)}$$

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

$$-\frac{1}{2} \ln |2x+2| + \frac{9}{2} \ln |2x-6|$$

$$\int \frac{4x+6}{x^2-2x-3} = -\frac{1}{2} \ln |2x+2| + \frac{9}{2} \ln |2x-6|$$

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

Resolve  $\frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)}$  into partial fraction

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

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

$$\text{When } x+1=0$$

$$x = -1$$

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

$$2 + 9 - 35 = A(-3)(2)$$

$$-24 = -6A$$

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

$$A = 4$$

$$\text{When } x-2=0$$

$$x = 2$$

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

$$8 - 18 - 35 = B(3)(5)$$

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

$$B = -3$$

$$\text{When } x+3=0$$

$$x = -3$$

$$2(-3)^2 - 9(-3) - 35 = A(-3-2)$$

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

$$+ C(-3+1)(-3-2)$$

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

$$C = 1$$

so we have,

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

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

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

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