

Name: PADKA DIJA YUSUFU
Department: MBBS (Medicine and Surgery)
Matric Number: 19/MHS01/381
MAT 104

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

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

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

At $x=1$, we have

$$A(4) = 11-3-8$$

$$A = 2$$

At $x=-3$

$$B(-4) = 11-3(-4)$$

$$B = -5$$

• We can now write

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

Let $u=x-1$

$$du=dx$$

$$2 \int \frac{du}{u} = 2 \ln|u|$$

Let $u=x+3$

$$du=dx$$

$$-5 \int \frac{du}{u} = -5 \ln|u|$$

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

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

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

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

At $x=3$

$$A(-2) = -4$$

$$A = 2$$

At $x=-1$

$$B(-4) = 12$$

$$B = -3$$

We can now write

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

let $u = x-3$

$$2 \int \frac{du}{u} = 2 \ln |u|$$

let $u = x+1$

$$du = dx$$

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

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

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

$$2x^2 - 9x - 35 = (x-7)(2x+5)$$

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

At $x = -1$ $A(-1-2)(-1+3) = (-1-7)(2(-1)+5)$
 $-6A = -24$
 $A = 4$

at $x = 2$
 $B(2+1)(2+3) = (2-7)(4+5)$
 $B \cdot 15 = -45$
 $B = -3$

at $x = -3$
 $C(-3+1)(-3-2) = (-3-7)(2(-3)+5)$
 $C \cdot (-10) = -10$
 $C = 1$

We can now write

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

let $u = x+1$
 $du = dx$
 $4 \int \frac{du}{u} = 4 \ln|u|$

let $u = x-2$
 $du = dx$
 $-3 \int \frac{du}{u} = -3 \ln|u|$

let $u = x+3$
 $du = dx$
 $\int \frac{du}{u} = \ln|u|$

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