

Usman Farisab Haniga

19/mbse1/421

171325, Maths

100 Level

Assignment

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

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

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

$$Ax + 3A + Bx - B = 11-3x$$

$$A+Bx + 3A - B = 11-3x$$

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

$$A+B = -3 \quad \dots \quad (i) \times 3$$

$$3A-B = 11 \quad \dots \quad (ii) \times 1$$

$$-3A + 3B = -9 \quad \dots \quad (iii)$$

$$-3A-B = 11 \quad \dots \quad (iv)$$

$$4B = -20$$

$$\therefore B = -5$$

Also: from eqn (i)

$$A+B = -3$$

$$A = -3 - B$$

$$A = -3 - (-5)$$

$$A = 2$$

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

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

Let $u = x-1$ $u = x+3$

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

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

$$\int \frac{du}{u} = 5 \int \frac{dx}{u}$$

$$2 \ln u = 5 \ln u$$

$$2 \ln(x-1) = 5 \ln(x+3)$$

$$\ln 11-3x = 2 \ln(x+3) \ln(x+3)$$

$$\ln x^2+2x-3$$

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

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

$$A(x-2) + Bx$$

$$\frac{Ax(x-2)}{x(x-2)} + \frac{Bx}{x(x-2)}$$

$$A(x-2) + Bx = 4x-16$$

$$Ax - 2x + Bx = 4x - 16$$

$$Ax + Bx - 2A = 4x - 16$$

$$(A+B)x - 2A = 4x - 16$$

$$A+B = 4 \quad \dots \quad (i) \times 2$$

$$-2A = -16 \quad \dots \quad (ii) \times 1$$

$$2A - 12B = 8 \quad \dots \quad (iii)$$

$$+2A \quad \dots \quad -16 \quad \dots \quad (iv)$$

$$2B = -8$$

$$B = -4$$

Also, from eqn (i)

$$A+B = 4$$

$$A = 4 - B$$

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

$$A = 8$$

MD 3 / Contd

$$\Rightarrow 18 + 21 - 35 - C [-2] [-5]$$

$$10 = 10C$$

$$C = 1$$

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

$$\text{Let } y = x+1 \quad \text{Let } u = x-2 \quad \text{Let } v = x-2$$

$$du = dx \quad dv = dx \quad dv = dx$$

$$4 \ln y \quad -3 \ln v \quad -3 \ln v$$

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

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

$$\int \frac{8}{x} dx + \int \frac{-1}{x-2} dx = \int \frac{4x-16}{x^2-2x} dx$$

$$\int \frac{8}{x} dx = \int \frac{4}{x} dx = \int \frac{4x-16}{x^2-2x} dx$$

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

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

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

$$8 \int \frac{dy}{y} \quad 4 \int \frac{dy}{y}$$

$$8 \ln y \quad 4 \ln y$$

$$8 \ln(x) - 4 \ln(x-2)$$

$$\int \frac{4x-16}{x^2-2x} = 8 \ln(x) - 4 \ln(x-2)$$

$$3) \int \frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+5)}$$

$$\frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+5)} = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{x+5}$$

$$\text{Multiply through by } (x+1)(x-2)(x+5)$$

$$2x^2 - 9x - 35 = A(x+3)(x-2) + B(x+1)(x-2) + C(x+1)(x+5)$$

$$\Rightarrow 2x^2 - 9x - 35 = A(x^2 + x - 6) + B(x^2 - x - 2) + C(x^2 + 6x + 5)$$

$$\Rightarrow 2x^2 - 9x - 35 = (A+B+C)x^2 + (A-B+6C)x + (-6A-2B+5C)$$

$$\Rightarrow 2 = A+B+C$$

$$-9 = A-B+6C$$

$$-35 = -6A-2B+5C$$

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

$$-24 = 2A$$

$$A = -12$$

$$A = 4$$

$$f(x) = \frac{2(-12)^2 - 9(-12) - 35}{(-12+1)(-12-2)}$$

$$= \frac{2(-12)^2 - 9(-12) - 35}{(-11)(-14)}$$