

NAME: UBERBETH, NDIANABRASI BONIFAKE
 DEPARTMENT: MIEGS
 MATHS NO: 191MHS01/411



MAT 104
 ASSIGNMENT

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

Solution

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

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

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

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

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

Multiply through by $(x+3)(x-1)$

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

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

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

$$A+B = -3 \quad \text{--- ①}$$

$$-A+3B = 11 \quad \text{--- ②}$$

Problem can ①

$$A = -3 - B$$

Substitute $A = -3 - B$ in eqn ②

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

$$3 + B + 3B = 11$$

$$4B = 8$$

$$B = 2$$

$$A = -3 - 2$$

$$A = -5$$

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

$$= -5 \ln|x+3| + 2 \ln|x-1|$$

$$= 2 \ln|x-1| - 5 \ln|x+3|$$

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

Solution

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

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

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

$$4x-16 = Ax + A + Bx - 3B$$

$$4x-16 = Ax + A + Bx - 3B$$

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

$$A+B = 4 \quad \text{--- (1)}$$

$$A-3B = -16 \quad \text{--- (2)}$$

from eqn (1)

$$A = 4 - B$$

Substitute $A = 4 - B$ in eqn (2)

$$4 - B - 3B = -16$$

$$4 - 4B = -16$$

$$4B = 16 + 4$$

$$4B = 20$$

$$B = 5$$

$$A = 4 - 5$$

$$A = -1$$

$$A = -1, B = 5$$

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

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

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



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

Solution

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

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

$$2x^2 - 9x - 35 = A(x^2 + x - 6) + B(x^2 + 4x + 3) + C(x^2 - x - 2)$$

$$(2x^2 - 9x - 35) = A(x^2 + x - 6) + B(x^2 + 4x + 3) + C(x^2 - x - 2)$$

$$2x^2 - 9x - 35 = Ax^2 + Ax - 6A + Bx^2 + 4Bx + 3B + Cx^2 - Cx - 2C + 3B - 6A - 2C$$

$$2x^2 - 9x - 35 = (A+B+C)x^2 + (A+4B-C)x - (6A+3B-2C)$$

$$A+B+C = 2 \quad \text{--- (1)}$$

$$A+4B-C = -9 \quad \text{--- (2)}$$

$$-6A+3B-2C = -35 \quad \text{--- (3)}$$

From eqn (1)

$$B = 2 - A - C$$

Substitute B = 2 - A - C in eqn (2)

$$A + 4(2 - A - C) - C = -9$$

$$A + 8 - 4A - 4C - C = -9$$

$$8 - 3A - 5C = -9$$

$$-3A - 5C = -17$$

$$3A + 5C = 17 \quad \text{--- (4)}$$

Substitute B = 2 - A - C in eqn (3)

$$-6A + 3(2 - A - C) - 2C = -35$$

$$-6A + 6 - 3A - 3C - 2C = -35$$

$$-9A - 5C = -35 - 6$$

$$-9A - 5C = -41$$

$$9A + 5C = 41 \quad \text{--- (5)}$$

eqn (4) - eqn (5)

$$3A + 5C = 17$$

$$9A + 5C = 41$$

$$9A + 5C = 41$$

$$-6A = -24$$

$$A = 4$$

$$3(A) + 5C = 17$$

$$12 + 5C = 17$$

$$5C = 17 - 12$$

$$5C = 5$$

$$C = 1$$

$$B = 2 - 4 - 1$$

$$B = -3$$

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

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