

BUBBA

SAAD BUBBA

19/mh 501/389

MHS, MBBS.

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

$$\frac{11-3x}{x^2+2x-3} = \frac{11-3x}{(x+3)(x-1)} = \frac{A}{x+3} + \frac{B}{x-1}$$

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

$$11-3x = A(x-1) + B(x+3) \quad \text{--- (i)}$$

When $x-1=0$, $x=1$ — put into eqn (i)

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

$$8 = 4B$$

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

$$B = 2$$

When $x+3=0$, $x=-3$ — put into eqn (i)

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

$$2 = -4A$$

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

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

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

$$= \int \frac{2}{x-1} - \int \frac{1/2}{x+3}$$

$$= 2 \ln|x-1| - \frac{1}{2} \ln|x+3|$$

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

$$= \frac{4x-16}{x^2-2x-3} = \frac{Ax-16}{(x-3)(x+1)} = \frac{A}{x-3} + \frac{B}{x+1}$$

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

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

When $x+1=0$, $x=-1$ — put into eqn ①

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

$$-4 - 16 = A(0) + B(-4)$$

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

$$B = 5 //$$

When $x-3=0$, $x=3$ — put into eqn ①

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

$$12 - 16 = A(4) + B(0)$$

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

$$A = -1 //$$

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

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

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

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

Multiplying through by $(x+1)(x-2)(x+3)$

$$2x^2 - 9x - 35 = A[(x-2)(x+3)] + B[(x+1)(x+3)] + C[(x+1)(x-2)] \quad \dots (i)$$

When $x-2=0$, $x=2$ — input to eqn (i)

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

$$8 - 18 - 35 = A(0) + B(15) + C(0)$$

$$8 - 18 - 35 = 15B$$

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

$$B = -3 //$$

When $x+3=0$, $x=-3$ — input to eqn (i)

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

$$18 + 27 - 35 = A(0) + B(0) + C(-2 \times -6)$$

$$10 = C(12)$$

$$10 = 12C$$

$$\frac{12C}{12} = \frac{10}{12}$$

$$C = \frac{5}{6} //$$

When $x \neq 1 = 0$, $x = -1$ - put into eqn (1)

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

$$2 - 9 - 35 = A[-3 \times 2] + B[0] + C[0]$$

$$-42 = -6A$$

$$\frac{-6A}{-6} = \frac{-42}{-6}$$
$$A = 7 //$$

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

$$= \int \frac{7}{x+1} - \frac{3}{x-2} + \frac{5/6}{x+3}$$

$$= \int \frac{7}{x+1} - \frac{3}{x-2} + \frac{5/6}{x+3}$$

$$= 7 \ln(x+1) - 3 \ln(x-2) + 5/6 \ln(x+3) //$$