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Mab 104
MBBS

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

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

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

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

At $x=-3$, we have

$B(-4) = 11-3(-3) = 11+9$

$B = -5$

At $x=1$, we have

$A(4) = 8$

$A = 2$

we can now write

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

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

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

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

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

At $x=3$, we have

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

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

$$B = -1$$

At $x=-1$, we have

$$A(-1-3) = 4(-1)-16$$

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

$$A = 5$$

We can write

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

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

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

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

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

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

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

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

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

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

$a+4B-C = -9 \quad -(2)$

$-6a-3B+2C = -35 \quad -(3)$

From equation 1 & 2

$A+B+C = 2$

$A+4B-C = -9$

$-3B = 11$

$B = -3$

From eqn (1)

$A - 3 + C = 2$

$A + C = 5$

$A = 5 - C$ to eqn (2)

$5 - C + 5 - C + 4C - 3) - C = -9$

$5 - C - 12 - C = -9$

$5 - 12 - C - C = -9$

$-7 - 2C = -9$

$-2C = -9 + 7$

$\frac{-2C}{-2} = \frac{-2}{-2}$

$C = 1$

For A (from eqn (1))

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

$A - 3 + 1 = 2$

$A - 2 = 2$

$A = 2 + 2$

$A = 4$

$\therefore Ans = 4\ln(x+1) - 3[\ln(x-2) + C\ln(x+3)$

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