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DEPARTMENT: MBS

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SERIAL NO: 075

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

$$x^2 + 2x - 3 = (x-1)(x+3)$$

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

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

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

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

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

$$A+B = -3$$

$$\begin{array}{r} 3A - B = 11 \\ \hline 4A = 8 \\ \hline A = 2 \end{array}$$

$$A = 2$$

$$A+B = -3$$

$$2+B = -3$$

$$B = -5$$

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

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

$$\int \frac{11-3x}{(x-1)(x+3)} = 2 \ln|x-1| - 5 \ln|x+3| + C$$

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

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

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

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

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

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

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

$$A+B = 4$$

$$-3A+B = -16$$

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

$$A = 5$$

$$A+B = 4$$

$$5+B = 4$$

$$B = -1$$

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

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

$$\int \frac{4x-16}{(x+1)(x-3)} dx = 5 \ln|x+1| - \ln|x-3| + C$$

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

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

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

$$2x^2 - 9x - 35 = A[x^2 + x - 6] + B[x^2 + 4x + 3] + C[x^2 - x - 2]$$

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

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

$$2x^2 - 9x - 35 = x^2[A+B+C] + x[A+4B-C] - 6A + 3B - 2C$$

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

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

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

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

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

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

$$\therefore 2 - B - C + 4B - C = -9$$

$$3B - 2C = -11 \quad \text{--- eqn (5)}$$

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

$$-6[2 - B - C] + 3B - 2C = -35$$

$$-12 + 6B + 6C + 3B - 2C = -35$$

$$9B + 4C = -23 \quad \text{--- eqn (6)}$$

$$\text{eqn (5) \& (6)}$$

$$3B - 2C = -11 \times 4$$

$$9B + 4C = -23 \times 2$$

$$12B - 8C = -44$$

$$18B + 8C = -46$$

$$\frac{308}{30} = \frac{-90}{30}$$

$$B = -3$$

$$8B - 2C = -11$$

$$3(-3) - 2C = -11$$

$$-9 - 2C = -11$$

$$-2C = -11 + 9$$

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

$$C = 1$$

$$C = 1$$

$$A = 2 - B - C$$

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

$$A = 4$$

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

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

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