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Medicine and Surgery

Medicine and Health Sciences

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

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

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

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

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

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

$$A+B = -3$$

$$A+B = 0 + \quad 3A-3B = 11$$

$$-3A - B = \frac{9}{4} = \frac{9}{4}$$

$$A = 2$$

$$A+B = -3$$

$$2+B = -3$$

$$B = -5$$

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

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

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

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

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

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

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

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

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

$$A + B = 4$$

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

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

$$A = 5$$

$$A + B = 4$$

$$\therefore B = 4 - 5 = -1$$

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

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

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

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

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

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

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

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

$$A+B+C = 2 \quad \dots \text{eqn (i)}$$

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

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

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

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

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

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

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

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

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

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

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

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

$$-12 + 1$$

eqn (vi) + (vii)

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

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

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

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

$$30B = -90$$

$$30 \quad \quad 30$$

$$B = -3$$

$$3B - 2C = -11$$

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

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

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

$$C = 1$$

$$A = 2 - B - C$$

$$A = 2 - (-3) - 1 \quad \therefore A = 4$$

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

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

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