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9/09/02/012

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

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

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

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

$$Ax + Bx = -3x$$

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

$$-A + 3B = 11 \quad \text{--- (ii)}$$

Adding we have

$$\frac{4b}{4} = \frac{8}{4}, \quad b=2$$

Subst z for b in equatin (i)

$$A + 2 = -3$$

$$A = -3 - 2 = -5$$

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

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

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

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

$$= \frac{\cancel{A(x+1)(x-2)(x+3)} - A(x-2)(x+3) + (Bx+C)(x+1)}{(x+1)(x-2)(x+3)}$$

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

$$= A(x^2+x-6) + Bx^2 + Bx + Cx + C = 2x^2 - 9x - 35$$

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

$$Ax^2 + Bx^2 = 2x^2$$

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

$$Ax + Bx + Cx = -9x$$

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

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

(2) - (1) we have

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

Subst -11 for C in eqn 3

$$-6A - 11 = -35$$

$$-6A = -35 + 11$$

$$-6A = -24$$

$$A = 4$$

Subst 4 for A in eqn 1

$$4 + B = 2$$

$$B = 2 - 4$$

$$B = -2$$

$$\frac{2x^2 - 9x - 35}{(x+1)(x-2)(x+3)} = \frac{4}{x+1} + \frac{(-2x + (-11))}{(x-2)(x+3)}$$

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

$$-2x-11 = A(x+3) + B(x-2)$$

$$-2x-11 = Ax + 3A + Bx - 2B$$

$$-2x = Ax + Bx$$

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

$$-11 = 3A - 2B$$

$$3A - 2B = -11 \quad \text{(2) } \times 1$$

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

$$3A - 2B = -11$$

$$3A + 2B = -4$$

Adding we have

$$6A = -15$$

$$A = -\frac{5}{2}$$

Subst $-\frac{5}{2}$ for A in eqn 1

$$-\frac{5}{2} + B = -2$$

$$B = -2 + \frac{5}{2} = \frac{1}{2}, B = \frac{1}{2}$$

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

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

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