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MAT 104

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

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

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

when $x = -3$

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

$$B = \frac{-20}{-4} \quad B = 5 //$$

when $x = +1$

$$A(4) = 11-3$$

$$A = \frac{8}{4} \quad A = 2 //$$

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

$$2 \ln|u| - 5 \ln|u|$$

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

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

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

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

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

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

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

When $x=3$

$$B(4) = 12-16$$

$$B = \frac{-4}{4} \quad B = -1$$

When $x = -1$

$$A(-4) = -20$$

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

$$A = 5$$

$$A = 5$$

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

$$\int \frac{4x - 16}{x^2 - 2x - 3} = 5 \ln(x+1) - 1 \ln(x+3) + C$$

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

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

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

~~2x~~

$$2x^2 - 9x - 35 = A(x^2 + 5x + 6) + B(x^2 + 2x + 3) + C(x^2 - x - 2)$$

$$\begin{aligned} 2x^2 - 9x - 35 &= Ax^2 + Ax + 6A + Bx^2 + 2Bx + 3B + Cx^2 - Cx - 2C \\ &= Ax^2 + Bx^2 + Cx^2 + Ax + 2Bx - Cx + 6A + 3B - 2C \\ &= x^2(A+B+C) + x(A+2B-C) + (6A+3B-2C) \end{aligned}$$

$$\begin{aligned} A+B+C &= 2 & - & 1 \\ A+2B-C &= -9 & - & 2 \\ 6A+3B-2C &= -35 & - & 3 \\ A &= 2-B-C & - & 4 \end{aligned}$$

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$$\begin{aligned} 2-B-C+4B-C &= -9 \Rightarrow 3B-2C = -11 \\ -12+6B+6C+3B-2C &= -35 \Rightarrow 9B+4C = -23 \\ 3B-2C &= -11 \\ 9B+4C &= -23 \end{aligned}$$

$$\begin{aligned} 3B-2C &= -11 \quad \times 4 = 12B-8C = -44 \\ 9B+4C &= -23 \quad \times 2 = 18B+8C = -46 \\ 30B &= -90 \end{aligned}$$

$$\begin{aligned} B &= -3 \\ B &= -3 \end{aligned}$$

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

$$3(-3) =$$

$$C = \frac{-11 + 9}{-2}$$

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

$$C = 1$$

$$A + B = A = 2 - B - C$$

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

$$A = 4$$

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

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