

Record your journey

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19/MARSO/142

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

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

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

Solving for $f(1)$

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

$$8 = 4B$$

$$B = 2$$

Solving for $f(-3)$

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

$$20 = -4A$$

$$A = -5$$

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

$$u = x - 1$$

$$\therefore dx = du$$

$$\frac{11 - 3x}{x^2 + 2x - 3} = -5 \int \frac{du}{u} + 2 \int \frac{du}{u}$$

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

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



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

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

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

Solve for $f(-1)$

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

$$-20 = -4B$$

$$B = 5$$

Solve for $f(3)$

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

$$-4 = 4A$$

$$A = -1$$

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

$$u = x-3 \quad dx = du$$

$$u = x+1 \quad dx = du$$

$$\frac{4x-16}{x^2-2x-3} = -1 \int \frac{du}{u} + 5 \int \frac{du}{u}$$

$$\frac{4x-16}{x^2-2x-3} = 5 \ln u - \ln u$$

$$x^2-2x-3$$

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



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

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

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

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

Solve for $f(1)$

$$2(-1)^2 - 9(-1) - 35 = A((-1)^2 + (-1) - 6) + B(-1)^2 + 4(-1) - 1$$

$$-24 = -6A$$

$$A = 4$$

Solve for $f(2)$

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

$$-45 = 15B$$

$$B = -3$$

Solve for $f(-3)$

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

$$10 = 10C$$

$$C = 1$$

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

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