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Dept: MBBG

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

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

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

Solving for $f(1)$

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

$$8 = 4B$$

$$B = 2$$

Solving for $f(-3)$

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

$$20 = -4A$$

$$A = -5$$

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

$$\text{Let } u = x+3; dx = du$$

$$u = x-1; dx = du$$

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

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

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

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

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

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

Solve for $f(-1)$

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

$$\cancel{-4} - 20 = -4B$$

$$B = 5$$

Solve for $f(3)$

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

$$-4 = 4A$$

$$A = -1$$

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

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

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

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

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

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

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

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

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

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

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

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

Solve for $f(1)$.

$$2(-1)^2 - 9(-1) - 35 = A((-1)^2 + (-1) - 6) + B((-1)^2 + 4(-1) + 3) + C((-1) - 1 - 2)$$

$$-24 = -6A$$

$$A = 4$$

Solve for $f(2)$

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

$$-15 = 15B$$

$$B = -3$$

Solve for $f(-3)$

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

$$10 = 10C$$

$$C = 1$$

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

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