

$$\int \frac{-5}{x+3}$$

$$u = x+3, \frac{du}{dx} = 1 \quad dx = du$$

$$\int \frac{-5}{u} \cdot du$$

$$= -5 \int \frac{1}{u} \cdot du$$

$$= -5 \ln|u|$$

$$\Rightarrow \frac{7}{11} \ln|x-1|$$

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

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

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

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

$$f(3)$$

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

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

$$-4 = A(4)$$

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

$$A = -1$$

$$f(-1)$$

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

$$-20 = B(-4)$$

$$\frac{-20}{-4} = B \Rightarrow B = 5$$

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

$$\int \frac{-1}{x-3}$$

$$u = x-3, \frac{du}{dx} = 1$$

$$dx = du$$

$$\int \frac{-1}{u} \cdot du$$

$$= -1 \int \frac{1}{u} \cdot du$$

$$= -1 \ln|u|$$

$$\int \frac{5}{x+1}$$

$$u = x+1, \frac{du}{dx} = 1$$

$$dx = du$$

$$\int \frac{5}{u} \cdot du$$

$$= 5 \int \frac{1}{u} \cdot du$$

$$= 5 \ln|u|$$

$$\Rightarrow -1 \ln|x-3| + 5 \ln|x+1|$$

$$\Rightarrow 1 \ln|x+3| - 5 \ln|x+1|$$

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

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

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

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

$$\begin{aligned} \text{When } x = -3 \Rightarrow f(-3) \Rightarrow 11-3(-3) &= B(-3-1) \\ \Rightarrow 20 &= B(-4) \Rightarrow \frac{20}{-4} = B \end{aligned}$$

$$B = -5, \text{ when } x = 1$$

$$f(1) \Rightarrow 11-3(1) = A(1+3)$$

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

$$7 = A(4)$$

$$7 = A$$

$\frac{7}{4}$

$$\int \frac{11-3x}{(x-1)(x+3)} = \int \frac{7/4}{x-1} + \int \frac{-5}{x+3}$$

$$\int \frac{7/4}{x-1}$$

$$u = x-1, \frac{du}{dx} = 1, dx = du$$

$$\int \frac{7/4}{u} \cdot dx \Rightarrow \frac{7}{4} \int \frac{1}{u} \cdot du = \frac{7}{4} \ln u$$

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

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

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

$$\text{let } x = -3$$

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

$$10 = 10C$$

$$+1 = C$$

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

$$\text{let } x = 2$$

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

$$8 - 18 - 35 = B(3)(5)$$

$$-45 = 15B$$

$$-3 = B$$

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

$$\text{let } x = -1$$

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

$$2 + 9 - 35 = A(-3)(2)$$

$$-24 = -6A$$

$$4 = A$$

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

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

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