

$$\text{let } u = x+1$$

$$\frac{du}{dx} = 1$$

$$du = dx$$

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

$$\frac{du}{dx} = 1$$

$$du = dx$$

$$\text{let } u = x+3$$

$$\frac{du}{dx} = 1$$

$$du = dx$$

$$4 \int \frac{1}{u} du$$

$$4 \ln u$$

$$4 \ln(x+1)$$

$$-3 \int \frac{1}{u} du$$

$$-3 \ln u$$

$$-3 \ln(x-2)$$

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

$$\ln u$$

$$\ln(x+3)$$

$$= 4 \ln(x+1) - 3 \ln(x-2) + \ln(x+3)$$

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

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

$$f(-1) = 4(-1) - 16 = A(-4) + B(0)$$
$$-4 - 16 = A - 4$$

$$A = 5$$

$$\text{for } f(x) = 4(3) - 16 = A(0) + B(4)$$
$$12 - 16 = 4B$$
$$-4 = 4B$$

$$B = -1$$

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

$$\text{let } u = x+1$$

$$\frac{du}{dx} = 1 \therefore du = dx$$

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

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

$$5 \ln u = 5 \ln(x+1)$$

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

$$\frac{du}{dx} = 1 \therefore du = dx$$

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

$$= \ln u$$

$$= -\ln(x-3)$$

$$\therefore 5 \ln(x+1), -\ln(x-3)$$

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

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

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

for  $x=2$

$$2(2)^2 - 9(2) - 35 = A(0)(5) + B(3)(5) + C(3)(0)$$

$$2(4) - 18 - 35 = 15B$$

$$-45 = 15B$$

$$B = \frac{-45}{15} = -\frac{45}{15} = -3$$

$$B = -3$$

for  $x=-1$

$$2(-1)^2 - 9(-1) - 35 = A(-3)(2) + B(0)(2) + C(0)(-8)$$

$$2 + 9 - 35 = -6A$$

$$-24 = -6A$$

$$A = 4$$

for  $x=-3$

$$2(-3)^2 - 9(-3) - 35 = A(-3-2)(0) + B(-3+1)(0) + C(-2)(-5)$$

$$2(9) + 27 - 35 = 10C$$

$$10 = 10C$$

$$C = 1$$

$$A = 4, B = -3, C = 1$$

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

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

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

$$f(1) = 11-3(1) = A(4) + B(0)$$

$$8 = 4A$$

$$A = 2$$

$$f(-3) = 11-3(-3) = A(0) + B(-4)$$

$$11+9 = 4B$$

$$20 = 4B$$

$$5 = B$$

$$B = -5$$

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

$$\text{let } u = (x-1)$$

$$\frac{du}{dx} = 1 \quad \therefore du = dx$$

$$\int \frac{2}{u} du = 2 \int \frac{1}{u} du$$

$$2 \ln u = 2 \ln(x-1)$$

$$\text{let } u = (x+3)$$

$$\frac{du}{dx} = 1 \quad \therefore du = dx$$

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

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

$$- 5 \ln u$$

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

$$\therefore 2 \ln(x-1), -5 \ln(x+3)$$