

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

multiply both sides by $(x-1)(x+3) \Rightarrow$

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

$$f(1) \Rightarrow 11-3(1) = A(1+3) + 0$$

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

$$f(-3) \Rightarrow 11-3(-3) = 0 + B(-3-1)$$

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

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

$$= 2 \ln|x-1| + 5 \ln|x+3|$$

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

$$= \frac{A}{(x-3)} + \frac{B}{(x+1)} \quad \text{multiply both sides by } (x-3)(x+1)$$

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

$$f(3) \Rightarrow 4(3)-16 = A(3+1) + 0$$

$$= 12-16 = 4A$$

$$= \frac{-4}{4} = \frac{4A}{4} \quad \therefore A = -1$$

$$f(-1) \Rightarrow 4(-1)-16 = 0 + B(-1-3)$$

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

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

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

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

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

multiply by $(x+1)(x-2)(x+3)$

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

$$f(2) \Rightarrow 2(2)^2 - 9(2) - 35 = 0 + B(2+1)(2+3) + 0$$

$$= -45 = B(3)(5)$$

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

$$f(-1) \Rightarrow 2(-1)^2 - 9(-1) - 35 = A(-1-2)(-1+3) + 0 + 0$$

$$= -24 = A(-3)(2)$$

$$\frac{-24}{-6} = \frac{-3A}{-3} \therefore A = 4$$

$$f(-3) \Rightarrow 2(-3)^2 - 9(-3) - 35 = 0 + 0 + C(-3+1)(-3-2)$$

$$= 10 = C(-2)(-5)$$

$$\frac{10}{10} = \frac{10C}{10} \therefore C = 1$$

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

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