

Group I

1)

$$x^2 - 4 \neq 0 \Leftrightarrow x^2 = 4 \Leftrightarrow x \neq 2 \cup x \neq -2$$

$$\cancel{x+3} > 0 \Leftrightarrow x \geq -3$$

~~$$D_f = [-3, -2] \cup [-2, +\infty]$$~~

2)

$$f(x) = \frac{2x+1}{x-3}, \quad x \neq 3$$

$$f(x) = \frac{\cancel{1}x-1}{-x+\cancel{3}}$$

3)

~~$$D_g = [0, +\infty]$$~~

$$D_f = \{x \in \mathbb{R}\}$$

Group II

$$1) \lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 3x + 2} = \cancel{\frac{(x-2)(x+2)}{(x-2)(x-1)}} \lim_{x \rightarrow 2} \frac{2x}{2x-3} = \frac{2(2)}{2(2)-3}$$

$$= \frac{4}{4-3} = \frac{4}{1} = 4$$

$$2) \lim_{x \rightarrow +\infty} \frac{3x^2 - x + 1}{2x^2 + 5} = \frac{\infty}{\infty}$$

$$3) \lim_{x \rightarrow 0} \frac{\sin(3x)}{x} = \frac{0}{0}$$

$$4) \lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1} = \frac{(1-1)(1+1)}{x-1} = \frac{(1-1)(1+1)}{1-1} = 1+1$$

$$= 2$$

$$k = 2$$

$$5) \frac{-3 + \boxed{3^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-3 + \boxed{9 - 4}}{2} = \frac{-3 + 5}{2} = \frac{2}{2} = 1$$

$$= \frac{-3 - 5}{2} = \frac{-8}{2} = -4$$

grupo III

$$1) x - 1 \neq 0 \Leftrightarrow x \neq 1$$

~~$$\lim_{x \rightarrow 1^+} = \frac{x^2 + 1}{x - 1} = \frac{1^2 + 1}{1^+ - 1} = +\infty$$~~

$$\lim_{x \rightarrow 1^-} = \frac{x^2 + 1}{x - 1} = \frac{1^- + 1}{1^- - 1} = -\infty$$

Asimptota vertical = 1

~~$$\lim_{x \rightarrow 1} \frac{x^2 + 1}{x - 1}$$~~

$$m = \lim_{x \rightarrow \pm\infty} \frac{\frac{x^2 + 1}{x+1}}{x} = \lim_{x \rightarrow \pm\infty} \frac{x^2 + 1}{x(x+1)} = \lim_{x \rightarrow \pm\infty} \frac{x^2 + 1}{x^2 + x} = 0$$

nem asimptoták alkalmaz.

$$2) 2x + 2 \neq 0 (\Leftrightarrow x = -1)$$

$$\text{f}(-2^+) \frac{2x-3}{x+2} = \frac{2(-2)-3}{-2^++2} = \frac{-1-3}{0^+} = +\infty$$

$$\text{f}(-2^-) \frac{2x-3}{x+2} = \frac{2(-2)-3}{-2^-+2} = \frac{-4-3}{0^-} = -\infty$$

Задача V

$$1) \int 3x^2 - 4x + 1 dx = x^3 - \frac{4x^2}{2} + x + C, C \in \mathbb{R}$$

$$2) \int \frac{1}{x} dx = \ln|x| + C, C \in \mathbb{R}$$

$$3) \int e^{2x} dx = e^{2x} + C, C \in \mathbb{R}$$

$$4) \int x \cdot e^x dx = \cancel{x} \cancel{e^x} - \int 1 \cdot e^x = x \cdot e^x - e^x = x + C, C \in \mathbb{R}$$

$$5) \int \cos(3x) dx = -\sin(3x) + C, C \in \mathbb{R}$$

$$6) \int \frac{dx}{x^2+1} dx = \frac{1}{2x} \arctan(x^2)$$

$$7) \int x \cdot \sin(x) dx = \frac{x^2}{2} \cdot \sin(x) - \int \frac{x^2}{x} \cdot \cos(x) dx =$$

$$\frac{x^2}{2} \cdot \sin(x) = x \cdot \sin(x) + C, C \in \mathbb{R}$$

$$8) \int \frac{1}{1+x^2} dx = \arctan(x) + C, C \in \mathbb{R}$$

Задача VI

$$1) \int_0^1 x^2 + 1 dx = [2x]_0^1 = 2(1) + 2(0) = 2$$

$$2) \int_1^e \frac{1}{x} dx = [\ln(x)]_1^e = \ln(e) + \ln(1) = 0 + 1 = 1$$

3) ~~$f(x) = 2x + 1$~~

$$f(3) = 2(3) + 1 = f(2) = 7$$

Group VII

$$1) \int_0^2 x^2 dx = [\frac{x^3}{3}]_0^2 = 2(2) + 2(0) = 4$$