

group I

1)

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

$$x+3 \geq 0 \Leftrightarrow x \geq -3$$

$$\cancel{D_f = [-3, -2[\cup]-2, +\infty[} \quad D_f = [-3, -2[\cup]-2, +\infty[$$

2)

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

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

3)

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

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

group II

$$1) \lim_{x \rightarrow 2} \frac{x^2 - 4}{x^2 - 3x + 2} = \frac{2^2 - 4}{2^2 - 3 \cdot 2 + 2} = \frac{0}{0} \quad \lim_{x \rightarrow 2} \frac{2x}{2x - 3} = \frac{2(2)}{2(2) - 3} = \frac{4}{1} = 4$$

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

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

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

$$= 2$$

$$k=2$$

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

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

Grupo III

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

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

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

Assimtoja vertical = 1

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

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

sem assimtoja obliqua.

$$2) \quad x + 2 \neq 0 \Leftrightarrow x \neq -2$$

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

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

Группа V

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

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

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

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

$$5) \int \cos(3x) dx = \frac{1}{3} \sin(3x) + C, C \in \mathbb{R}$$

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

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

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

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

Группа VI

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

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

$$3) \text{ ~~1) } \int_1^e \frac{1}{x} dx = [\ln(x)]_1^e = \ln(e) + \ln(1) = 0 + 1 = 1~~$$

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

Group VII

$$1) \int_0^2 x^2 dx = \left[\frac{x^3}{3} \right]_0^2 = \frac{2^3}{3} - \frac{0^3}{3} = \frac{8}{3}$$