Groupe I

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

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

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

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

$f(x)^{-1} = \frac{\frac{1}{2}x - 1}{-x + \frac{7}{3}}$

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

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

Groupe II

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

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

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

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

4)

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

$$= 2$$

$$k = 2$$

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

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

Grupo III

1)

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

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

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

Assimptota vertical = 1

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

sem assimptota oblíqua.

2) $x + 2 \neq 0 \iff x \neq -2$

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

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

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

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

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

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

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

$\frac{x^2}{2} \cdot \operatorname{sen}(x) - x \cdot \operatorname{sen}(x) + C, \; C \in \mathbb{R}$

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

Grupo VI

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

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

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

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

Grupo VII

1) $\int_0^2 x^2\,dx = [2(x)]_0^2 = 2(2) + 2(0) = 4$