1a) $x^2 - 1 \neq 0 \iff x^2 \neq 1 \iff x \neq 1$ $\quad x \neq -1$

$x + 2 \geqslant 0 \iff x \geqslant -2$

$Df(x) = [-2, -1[\cup]-1, +\infty[$

b) $4 - x^2 > 0 \iff -x^2 > -4 \iff x^2 < 4 \iff x < 2$

$D_g =]-2, 2[\cup]2, +\infty[$ $\quad x < -2$

2a) $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{x^2 - 3x + 2} = \dfrac{\cancel{(x-1)}(x+1)}{\cancel{(x-1)}(x-2)} = \dfrac{x+1}{x-2} = \dfrac{1+1}{1-2} =$

$\dfrac{2}{-1} = -2$

b) $\lim\limits_{x \to +\infty} \dfrac{5x^2 + 3x - 1}{2x^2 - x + 4} \ (/x^2) = \dfrac{5 + \frac{3}{x} - \frac{1}{x^2}}{2 - \frac{1}{x} + \frac{4}{x^2}} = \dfrac{5}{2} =$

c) $\lim\limits_{x \to 0} \dfrac{\sqrt{4+x} - 2}{x} =$

3) $x - 1 \neq 0 \iff x \neq 1$

$f(1) = x^2 - 1 = (x-1)(x+1) = (1-1)(1+1) = 2$

$K = 2$

4)

$g(0) = x^3 - 4x + 2 = 2$

$g(1) = x^3 - 4x + 2 = 1^3 - 4(1) + 2 = 1 - 4 + 2 = -1$

$g(0) = 2 > 0$

$g(1) = 1 < 0$

5) $x-2 \neq 0 \Leftrightarrow x \neq 2$

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

$$m = \frac{x^2-2x+3}{x(x-2)} = \frac{\cancel{x^2-2x}+3}{\cancel{x^2-2x}} = 3$$

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

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

Assintota vertical : 2

assintota horizontal = Não tem grau 2 / grau 1

assintota obliqua = $3x - 1$

6a) $\dfrac{2x \times x+1 - 1 \times x^2-3}{(x+1)^2}$

b) $5(2x^3+x-1)^4 \times (6x^2+1)$

c) $3e^{3x} \cdot \ln(x) + e^{3x} \cdot \frac{1}{x}$

7)

$$f(2) = x^2 - 3x + 1 = 2^2 - 3(2) + 1 = -1$$

$$f'(2) = 2x - 3 = 2(2) - 3 = 4 - 3 = 1$$

$$y = x + (-1 - 1 \times (-1)) = x$$

8a) $\int 5x^2 - 4x + 3\, dx = \frac{5x^3}{3} - \frac{4x^2}{2} + 3x + c,\ c \in \mathbb{R}$

b) $\int \frac{4x}{x^2+1} = 2\ln(x^2+1) + c,\ c \in \mathbb{R}$

c) $\int x \cdot e^{3x}\, dx = x \cdot \frac{e^{3x}}{3} - \int e^{3x} = x \cdot \frac{e^{3x}}{3} - \frac{e^{3x}}{3} + c,\ c \in \mathbb{R}$

d) $\int 1 \cdot \ln(x)\, dx = x \cdot \ln(x) - \int 1 = x \cdot \ln(x) - x + c,\ c \in \mathbb{R}$

9a) $\int_0^2 x^2 - 3x + 2\, dx = \left[\frac{x^3}{3} - \frac{3x^2}{2} + 2x\right]_0^2 =$

$\frac{2^3}{3} - \frac{3(2)^2}{2} + 2(2) - \frac{0^3}{3} - \frac{3(0)^2}{2} + 2(0) = \underset{(\times 2)}{\frac{8}{3}} - \underset{(\times 3)}{\frac{12}{2}} + \underset{(\times 6)}{\frac{4}{1}}$

$\frac{16}{6} - \frac{36}{6} + \frac{24}{6} = \underset{(/2)}{\frac{4}{6}} = \frac{2}{3}$

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

10) $F(x) = 2x^2 - 2x + c,\ c = 1$