Teste 9

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

$\sqrt{3-x} \geq 0 \Leftrightarrow -x \geq -3 \Leftrightarrow x \leq 3$

$D_f =]2;3]$

2) $\lim\limits_{x\to 2} \frac{x^2-4}{x^2-5x+6} = \frac{2x}{2x-5} = \frac{2(2)}{2(2)-5} = \frac{4}{4-5} = \frac{4}{-1} = -4$

b) $\lim\limits_{x\to +\infty} \cancel{\frac{2x^2-x+1}{2x^2+5}}$

3) $x-3 \neq 0 \Leftrightarrow x \neq 3$

$\cancel{f(3) = \frac{x^2-9}{x-3} = \frac{(3)^2-9}{3-3} = \frac{0}{0}}$

$f(3)\ \frac{(\cancel{x-3})(x+3)}{\cancel{x-3}} = x+3 = 3+3 = 6$

$K = 6$

4) $f(2) = x^3-2x-5 = (2)^3-2(2)-5 = 8-4-5 = -1$

$f(3) = x^3-2x-5 = (3)^3-2(3)-5 = 27-6-5 = 16$

$f(2) = -1 < 0$

$f(3) = 16 > 0$

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

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

$$= \frac{0}{0^+} = 0$$

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

$$b = \lim_{x\to+\infty} = \left[\frac{x^2+2x-3}{x-1} - (2x-3)x\right] =$$

6)
a) $\cancel{f(1) = x^3 - 6x^2 + 9x + 2 = (1)^3 - 6(1)^2 + 9(1) + 2 =}$

$\cancel{= 1 - 6 + 9 + 2 = 6}$

$\cancel{f'(6) = x^3 - 6x^2 + 9x + 2 = 3x^2 - \ldots + 9 = 3x^2 - \ldots + 9}$

$\cancel{= 3(6)^2 - \ldots + 9 = - \ldots}$

$$f(0) = x^3 - 6x^2 + 9x + 2 = (0)^3 - 6(0)^2 + 9(0) + 2 = 2$$

$$f'(0) = x^3 - 6x^2 + 9x + 2 = 3x^2 - 12x + 9 =$$

$$3(0)^2 - 12(0) + 9 = 9$$

$$y = 9x + (2 - 9(0) = 9x - 2$$

6 b)

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

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

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

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

$= \frac{8}{3} + 2 = \frac{14}{3}$

9)

10)