teste 8

1) $4-x \geq 0 \Leftrightarrow -x = -4 \Leftrightarrow x > 4$

$D_f = \{x \in \mathbb{R} \mid x > 4\}$

2) a) $\lim\limits_{x \to} = \frac{x^2-9}{x-3} = \frac{2x}{1} = 2x = 2(3) = 6$

b) $\lim\limits_{x \to +\infty} = \frac{2x^3+x}{x^3-1} = 2 \lim\limits_{x \to +\infty} = \frac{\cancel{x^3}+x}{\cancel{x^3}-1} = 2 \lim\limits_{x \to +\infty} = -x$

$2 \times (-1) = -2$

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

4)
$f(0) = x^3 - 3x + 1 = (0)^3 - 3(0) + 1 = 0 - 0 + 1 = 1$

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

$f(0) = 1 > 0$

$f(1) = -1 < 0$

existe zero entre $[0, 1]$.

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

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

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

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

$m = 1$

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

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

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

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

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

$$b = \lim_{x\to+\infty} \left[\frac{\cancel{x^2}+2x-\cancel{x^2}+x}{x-1}\right] = \frac{3x}{x-1} = \frac{3}{1-\frac{1}{x}} = \frac{3}{1-0} = 3$$

$b = 3$

$y = x + 3$

Assintota vertical $= 1$

Assintota obliqua $= x + 3$

6)

a)

b)

7)

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

~~b) [illegible]~~

b) $\frac{4x}{x^2+1} = 4x \, \overset{\text{arctan}}{\cancel{}}(x) + c, c \in \mathbb{R}$

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

9) $\int_1^2 2x + 1 \, dx = \left[\frac{2x^2}{2} + x\right]_1^2 = \left(\frac{2(1)^2}{2} + 1\right) + \left(\frac{2(2)^2}{2} + 2\right)$

$= \left(\frac{2}{2} + 2\right) + \left(\frac{8}{2} + 2\right) = 3 + 6 = 9$

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

$0 - \left[\frac{2}{6} + \frac{3}{6}\right] = 0 - \frac{5}{6} = -\frac{5}{6}$