Calculo I
Lista 3
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1) $\frac{x^2-4}{x-1}$

a) $f(0) = \frac{0-4}{0-1} = \frac{-4}{-1} = 4$

$f(0)=4$

b) $f(-2) = \frac{(-2)^2-4}{-2-1} = \frac{4-4}{-3} = \frac{0}{-3}$

c) $f(x-2) \quad \frac{(x-2)^2-4}{x-2-4} = \frac{x^2-2x-2x+4-4}{x-6} = \frac{x^2-4x}{x-6}$

2)

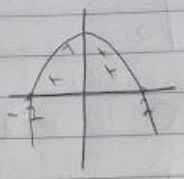
a) $D=\mathbb{R}$

b) $4-x^2 \geq 0$

$\Delta = 0-4.-1.4 \quad x = \frac{0 \pm 4}{-2} \quad x' = -2 \quad x'' = 2$

$\Delta = 16$

$[-2,2] \quad D=\{x \in (-2,2)\}$



c) $x-4 \geq 0 \quad D=\{x \in \mathbb{R} \mid x \neq 4\}$

$x-4<0$

$x>4$

$x<4$

d) $x-2 \geq 0$

$x \geq 2$ $\quad D = \{x \in \mathbb{R} \mid x \geq 2\}$

e) $x^2 - 4x + 3 \geq 0$ $\quad x' = \frac{6}{2} = 3 \quad x \geq 3$

$\Delta = 16 - 12$

$\Delta = 4$ $\quad x'' = \frac{2}{2} = 1 \quad x \leq 1$

$D = \{x \in \mathbb{R} \mid 3 \leq x \leq 1\}$

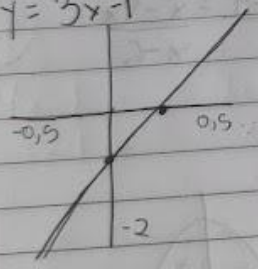
f) $3 + x \geq 0$ $\quad 7 - x \geq 0$

$x \geq -3$ $\quad -x \geq -7$ $\quad D = (-\infty, 3] \cup [7, +\infty)$

$x \leq 7$

3)

a) $y = 3x - 1$

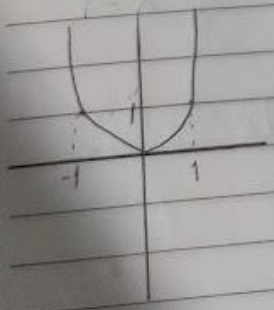


$D = \mathbb{R}$

$Im = \mathbb{R}$

b) $y - x^2 = 0$ $\quad D = \mathbb{R}^+$

$Im = \mathbb{R}^+$



c) não é uma função $y = f(x)$

d) $y + \sqrt{4-x^2} = 0$

$y = -\sqrt{4-x^2}$

$-\sqrt{4-x^2} = 0$

$-x^2 = -4$ $\quad x = \pm 2$

$x^2 = 4$ $\quad -2, 2$

$4 - x^2 \geq 0$

$-x^2 \geq -4$

$x^2 \leq 4$

$x \leq 2$

e) não é uma função $y = f(x)$

4)

a) $x^2 + 8x + 14$

$\Delta = 8^2 - 4 \cdot 1 \cdot 14$

$\Delta = 64 - 56$

$\Delta = 8$

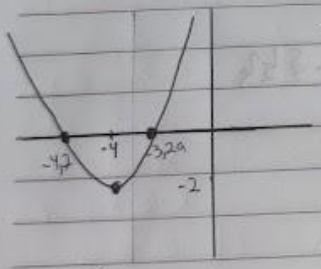
$x = \frac{-8 \pm \sqrt{8}}{2}$

$x' = \frac{-8 + \sqrt{2}}{2} = -3,29$

$x'' = \frac{-8 - \sqrt{2}}{2} = -4,70$

$X_V = -\frac{8}{2} = -4$

$Y_V = -\frac{8}{4} = -2$



$D = \mathbb{R}$

$Im = [-2, +\infty]$

Decrescimento: $]-\infty, -4]$

Crescimento: $[-4, +\infty[$

b) $-x^2 + 4x - 1$

$\Delta = 4^2 - 4 \cdot -1 \cdot -1$

$\Delta = 16 - 4$

$\Delta = 12$

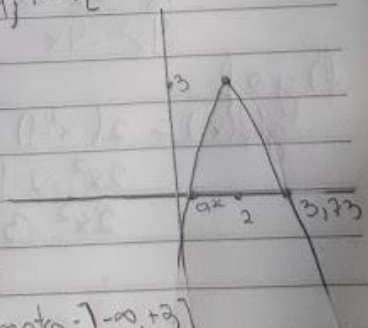
$x = \frac{-4 \pm \sqrt{12}}{-2}$

$x' = 2 - \sqrt{3} = 0,26$

$x'' = 2 + \sqrt{3} = 3,73$

$X_V = \frac{-4}{-2} = +2$

$Y_V = \frac{-12}{-4} = +3$



$D = \mathbb{R}$

$Im = [3, +\infty[$

crescimento: $]-\infty, +3]$

decrescimento: $[3, +\infty[$

5) $f(x) = x^2 - 1$ $g(x) = 2x - 1$

a) $f + g$

$(x^2 - 1) + (2x - 1)$ $D = \mathbb{R}$

$x^2 + 2x - 2$

b) $f - g$

$(x^2 - 1) - (2x - 1)$

$2x^2 - 1 - 2x + 1$ $D = \mathbb{R}$

$2x^2 - 2x$

c) $f \cdot g$

$(x^2 - 1)(2x - 1)$

$2x^3 - x^2 - 2x + 1$ $D = \mathbb{R}$

d) f/g

$\frac{x^2 - 1}{2x - 1}$ $\quad 2x - 1 \neq 0$ $\quad D = \{x \in \mathbb{R}\} - \{\frac{1}{2}\}$

$2x \neq 1$

$x \neq \frac{1}{2}$

e) $f \circ g$

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

$(2x - 1)(2x - 1) - 1$

$4x^2 - 2x - 2x + 1 - 1$

$4x^2 - 4x$ $\quad D = \mathbb{R}$

f) $g \circ f$

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

$2x^2 - 2 - 1$ $\quad D = \mathbb{R}$

$2x^2 - 3$