Calculo 1

Exercicios de limite.

1) a) $3^2 - 3.3 + 5 = 5$

b) $2.(-2)^3 - 6.(-2)^2 + 3.(-2) - 2$
$-16 - 24 - 6 - 2 = -48$

c) $\frac{4}{2-6+5} = \frac{4}{1} = 4$

d) $\lim_{x \to 1} (x^2 + x + 1) = 3$

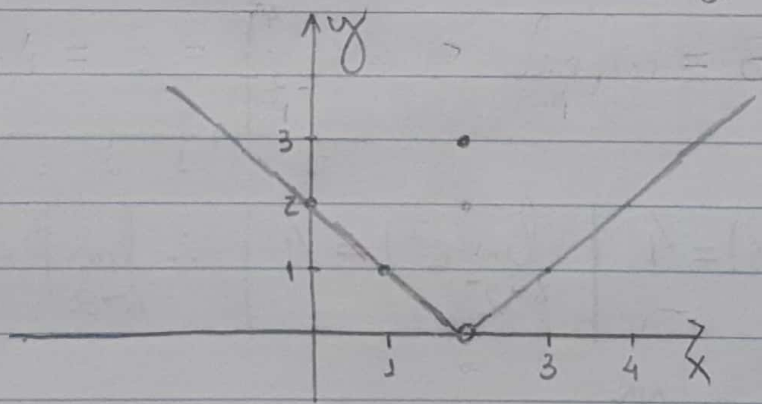
e) $\sqrt{5}$

f) $5.0.\sqrt{4+3.0} = 0$

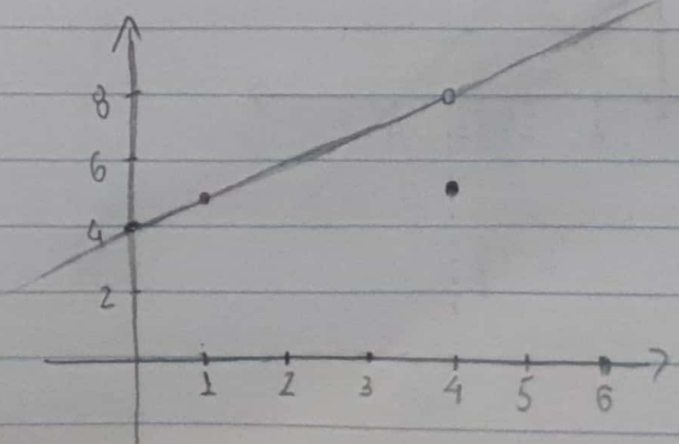
Exercícios de limites laterais.

a) $\lim_{x \to 2^+} (x-2) = 0$ $\quad \lim_{x \to 2^-} (-x+2) = 0 \Rightarrow \lim_{x \to 2} f(x) = 0$

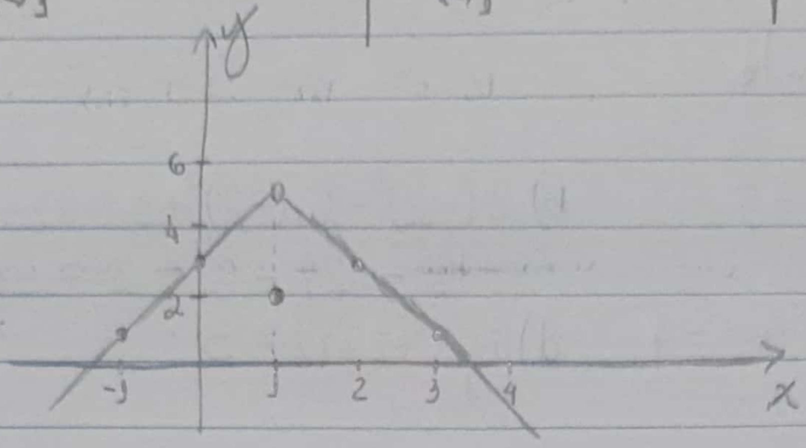
b)




b) $\lim_{x \to 4^+} \left( \frac{x^2 - 16}{x - 4} \right) = 8$ $\quad \lim_{x \to 4^-} f(x) = 8 \Rightarrow \lim_{x \to 4} f(x) = 8.$

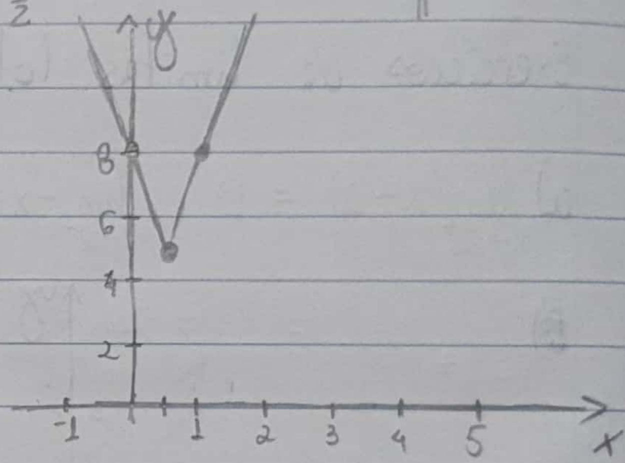


c) $\lim\limits_{x \to 1^+} (7-2x) = 5$ | $\lim\limits_{x \to 1^-} (2x+3) = 5$ | $\Rightarrow \lim\limits_{x \to 1} f(x) = 5$

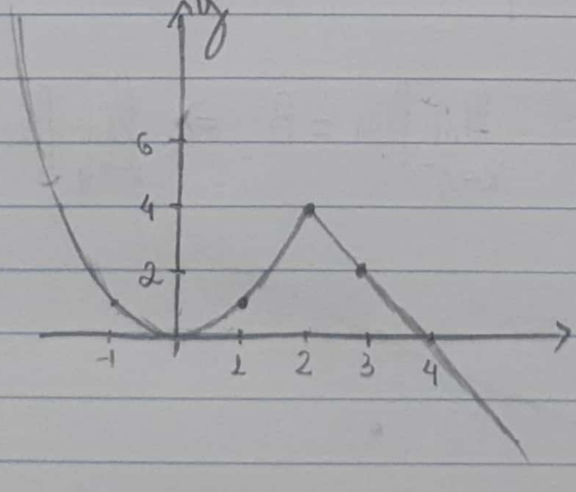



d) $\lim\limits_{x \to 1/2^+} 5+6x-3 = 5$ | $\lim\limits_{x \to \frac{1}{2}^-} 5-6x+3 = 5$ |

$\therefore \lim\limits_{x \to 1/2} f(x) = 5$

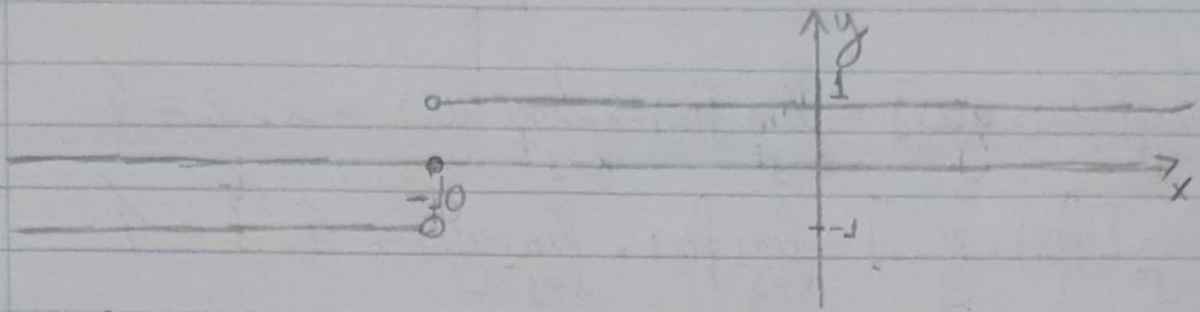



e) $\lim\limits_{x \to 2^+} (8-2x) = 4$ | $\lim\limits_{x \to 2^-} (x^2) = 4$ | $\therefore \lim\limits_{x \to 2} f(x) = 4$



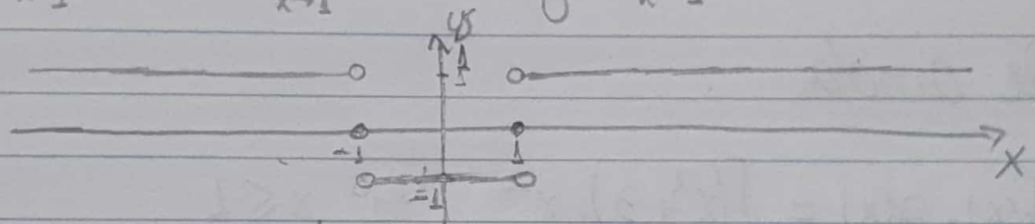
f) $\lim_{x \to -10^+} \left(\frac{x+10}{x+10}\right) = 1$ | $\lim_{x \to -10^-} \left(\frac{x+10}{-(x+10)}\right) = -1$

Como $\lim_{x \to -10^+} f(x) \neq \lim_{x \to -10^-} f(x)$, logo $\lim_{x \to -10} f(x)$ não existe



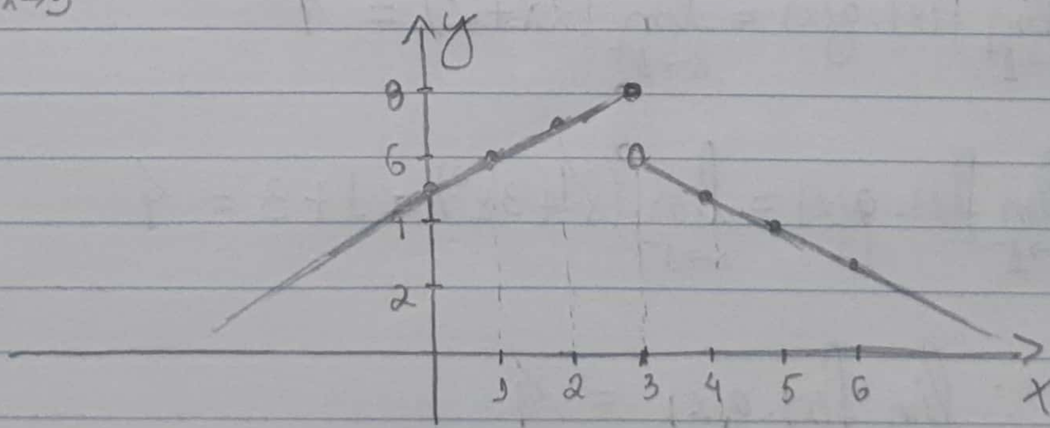

g) $\lim_{x \to 1^+} \left(\frac{x^2-1}{x^2-1}\right) = 1$ | $\lim_{x \to 1^-} \left(\frac{x^2-1}{-(x^2-1)}\right) = -1$

Como $\lim_{x \to 1^+} f(x) \neq \lim_{x \to 1^-} f(x)$, logo $\lim_{x \to 1} f(x)$ não existe




h) $\lim_{x \to 3^+} (9-x) = 6$ | $\lim_{x \to 3^-} (5+x) = 8$

$\therefore \lim_{x \to 3} f(x)$ não existe




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

$\therefore \lim_{x \to 1} f(x)$ não existe

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

$\therefore \lim_{x \to 1} g(x)$ não existe.

$\lim_{x \to 1^+} [f(x) \cdot g(x)] = \lim_{x \to 1^+} f(x) \cdot \lim_{x \to 1^+} g(x) = 2 \cdot 2 = 4$

$\lim_{x \to 1^-} [f(x) \cdot g(x)] = \lim_{x \to 1^-} f(x) \cdot \lim_{x \to 1^-} g(x) = 4 \cdot 1 = 4$

$\therefore \lim_{x \to 1} [f(x) \cdot g(x)] = 4$

Ou ainda

$$f(x) \cdot g(x) = \begin{cases} (x^2+3) \cdot x^2 & \text{se } x \leq 1 \\ (x+1) \cdot 2 & \text{se } x > 1 \end{cases}$$

logo

$\lim_{x \to 1^+} f(x) \cdot g(x) = \lim_{x \to 1^+} (2x+2) = 4$

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

$\therefore \lim_{x \to 1} f(x) \cdot g(x) = 4$