

# Funções com raiz quadrada



ESTUDAMOS A FUNÇÃO

$$\frac{\sqrt{(x-1)(x-3)}}{(x-2)(x-4)}$$

comportamento assintótico

$$x \rightarrow \pm \infty$$

$$f(x) \sim \frac{\sqrt{x^2}}{x^2} \rightarrow 0^+$$

$0^+$

$$\begin{matrix} (+\infty, 0^+) \\ (-\infty, 0^+) \end{matrix}$$

DOMÍNIO  $(x-1)(x-3) > 0$

ZEROS

$$x=1 \text{ e } x=3$$

$$(1,0) \quad (3,0)$$

$$\begin{matrix} + & 1 & 0 & 3 & + \\ & \bullet & & \bullet & \\ x \leq 1 & & \text{ok!} & & \\ x \geq 3 & & \text{ok!} & & \end{matrix}$$

REGIÃO PROIBIDA  $1 < x < 3$

ASSÍNTOTAS

$$x=2 \text{ e } x=4$$

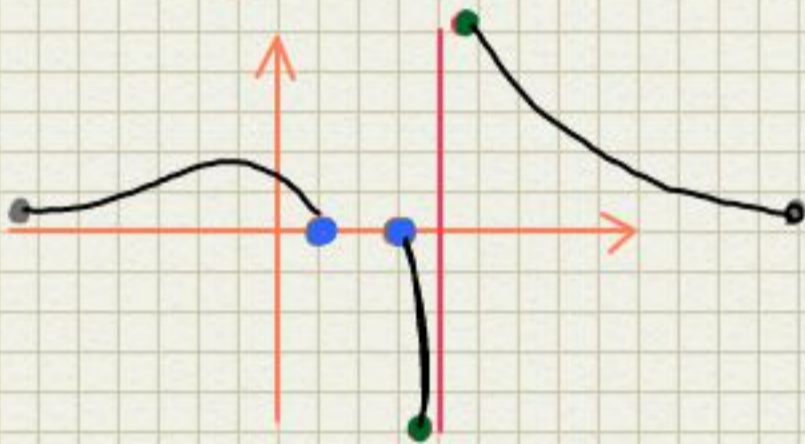
MAS

$$x=2$$

ESSA NA REGIÃO PROIBIDA

$$\left( \bar{L}^-, \frac{+}{+-} \infty \right) \quad \left( \bar{L}^+, \frac{+}{++} \infty \right)$$

$$\left( \bar{L}^-, -\infty \right) \quad \left( \bar{L}^+, +\infty \right)$$



Calculamos agora o MAX

$$\begin{aligned} & \left[ (x^2 - 4x + 3)^{\frac{1}{2}} \right]' (x^2 - 6x + 8) - (x^2 - 4x + 3)^{\frac{1}{2}} (2x - 6) \\ & \left\{ \begin{aligned} & \frac{1}{2} (x^2 - 4x + 3)^{-\frac{1}{2}} (2x - 4)(x^2 - 6x + 8) \\ & - (x^2 - 4x + 3)^{\frac{1}{2}} (2x - 6) \end{aligned} \right. \end{aligned}$$

MULTIPLICANDO POR  $(x^2 - 4x + 3)^{\frac{1}{2}}$

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

$$\begin{aligned} & 2x^3 - 12x^2 + 16x - 4x^2 + 24x - 32 \\ & - 4x^3 + 12x^2 + 16x^2 - 48x - 12x + 36 \end{aligned}$$

$$-2x^3 + 12x^2 - 20x + 4 = 0$$

$$x^3 - 6x^2 + 10x - 2 = 0 \Rightarrow \text{MAX / MIN}$$

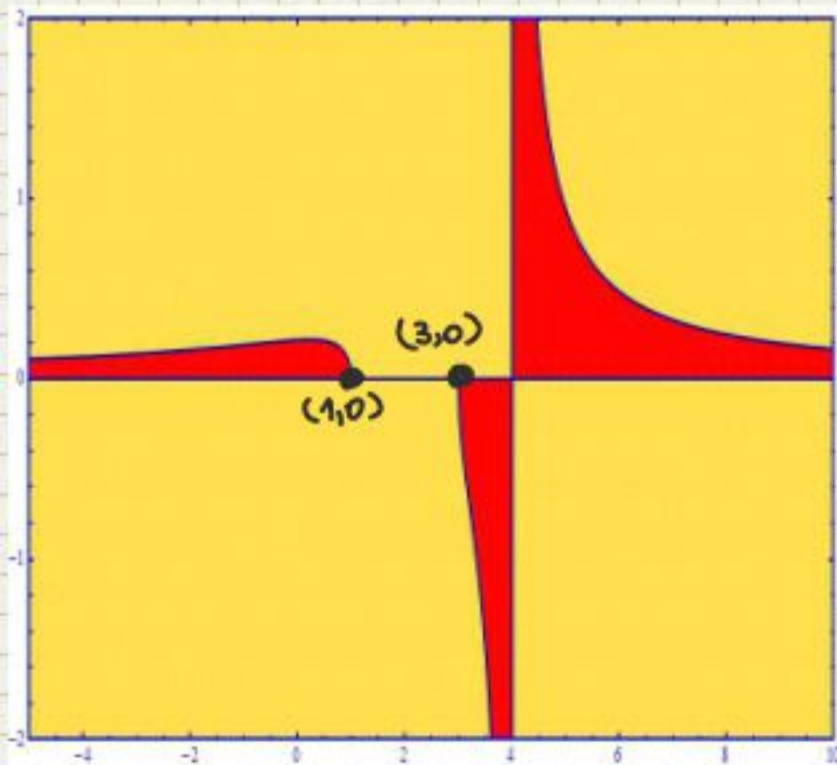
$$x=1 \quad 1 - 6 + 10 - 2 = 3 > 0$$

$$x=0 \quad -2 < 0$$

MAX ENTRE 0 E 1

SOLUÇÃO NUMÉRICA  $x = 0.23$

$$f(x) = 0.22$$



AGORA ESTUDAREMOS A FUNÇÃO

$$\frac{1}{f(x)}$$

$$(x-2)(x-4) / \sqrt{(x-1)(x-3)}$$



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

$$(2x-4)(x-1)(x-2) - 2(2x-3)(x-1)(x-3) = 0$$

Podemos colocar em evidência  $(x-1)$

$$(2x-4)(x-2) + (6-4x)(x-3) = 0$$

$$\begin{array}{r} 2x^2 - 4x \\ -4x + 8 \\ -4x^2 + 12x \\ \hline \end{array}$$

$$-2x^2 + 10x - 10 = 0$$

$$x^2 - 5x + 5 = 0$$

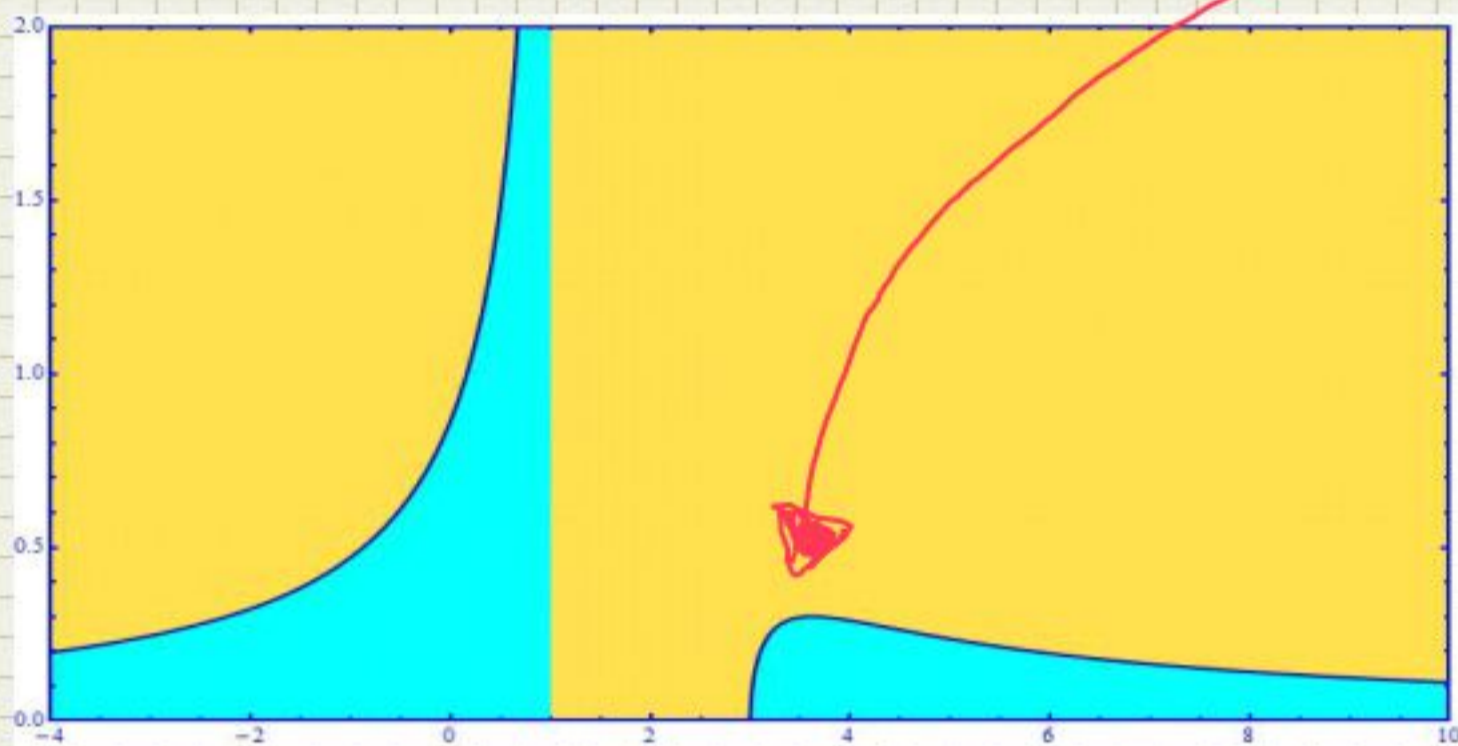
$$x = \frac{5 \pm \sqrt{25-20}}{2} = \frac{5 \pm \sqrt{5}}{2}$$

$$\frac{5-\sqrt{5}}{2} \sim 1.4 \quad \frac{5+\sqrt{5}}{2} \sim 3.6$$

FORA DO DOMÍNIO

MÁXIMO  $\sim \left( \frac{5+\sqrt{5}}{2}, \frac{2\sqrt{5-2}}{1+\sqrt{5}} \right)$

$\sim (3.6, 0.3)$



ESTUDAMOS AGORA  $\frac{1}{f(x)} : \frac{(x-1)(x-2)}{\sqrt{(x-1)(x-3)}}$

1)  $x \rightarrow \pm\infty \quad \frac{1}{f(x)} \rightarrow \frac{1}{0^+} \rightarrow +\infty$

$\pm\infty, +\infty$

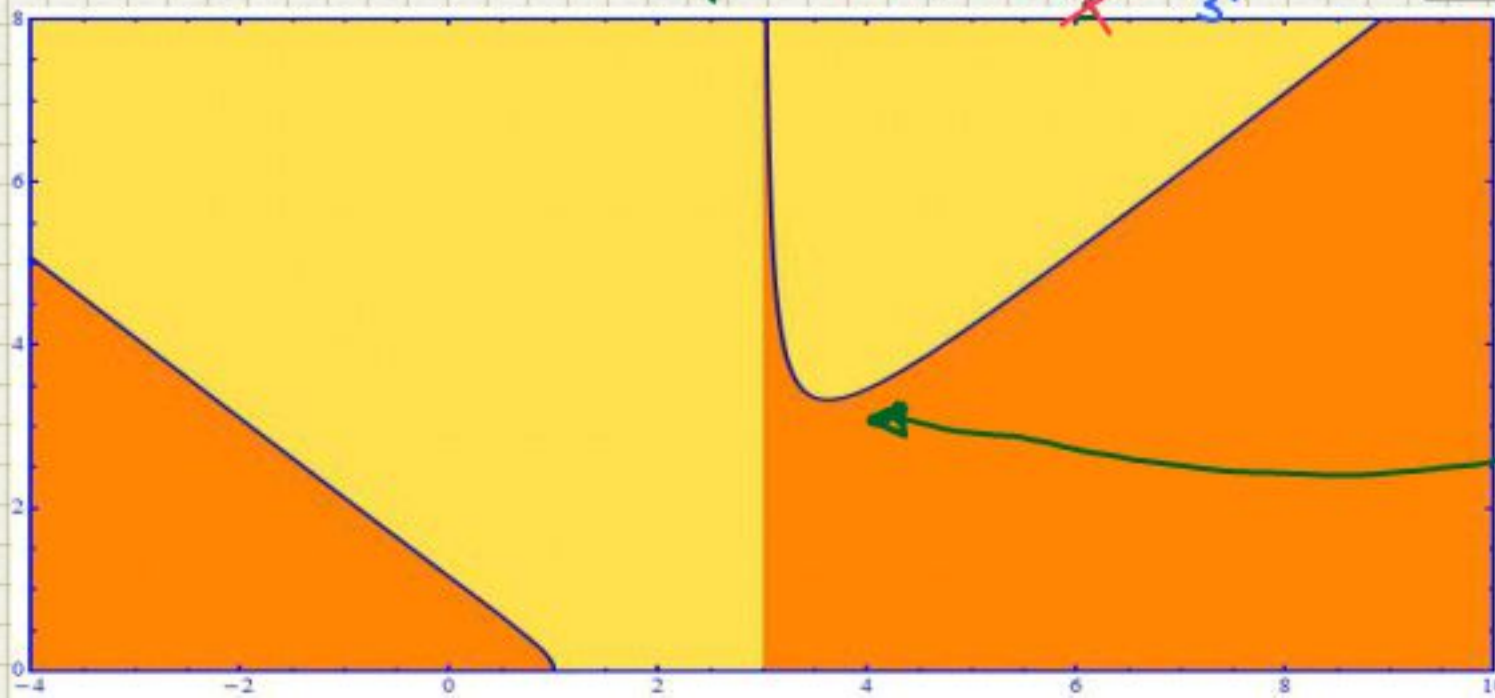
2) O DOMÍNIO NÃO MUDA

$x \leq 1 \text{ e } x \geq 3$

3) E 4) INVERTEM

$\left(1^-, \frac{1}{+\infty}\right) \left(3, ? \infty\right)$

$\left(1^-, 0^+\right) \left(3^+, +\infty\right)$



MÍNIMO

$\left( \frac{5+\sqrt{5}}{2}, \frac{1+\sqrt{5}}{2\sqrt{5-2}} \right)$

$\sim (3.6, 3.3)$