$$\frac{\sqrt{x^2-4}}{x^2+2x-3} \qquad \frac{x^2-4}{x(x^2+2x-3)}$$

$$\frac{\sqrt{f(x)}}{g(x)} \qquad \frac{f(x)}{x\,g(x)}$$

$$f(x) = x^2-4$$
$$g(x) = x^2+2x-3$$

$f(x)=0 \quad x^2-4=0 \quad x^2=4 \quad x=\pm 2$

$g(x)=0 \quad x^2+2x-3=0$

$$x_{1/2} = \frac{-2\pm\sqrt{4+12}}{2} = \frac{-2\pm 4}{2} \begin{cases} 1 \\ -3 \end{cases}$$

$f(x) = (x+2)(x-2)$

$g(x) = (x+3)(x-1)$

$(-2,0)\ (2,0)$ ZEROS DAS FUNÇÕES $(-2,0)\ (2,0)$

DOMÍNIO

$+ \quad -2 \quad - \quad 2 \quad +$

ASSÍNTOTAS VERTICAIS

$(-3^{\pm}, ?\infty)$

$\cancel{(1^{\pm}, ?\infty)}$

NA ZONA PROIBIDA

$(0^{\pm}, ?\infty)$

$(-3^{\pm}, ?\infty)$

$(1^{\pm}, ?\infty)$

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

$-3^-(-3.1) \quad +/--$

$(-3^-, +\infty)$

$-3^+(-2.9) \quad +/+-$

$(-3^+, -\infty)$

$-3^-(-3.1) \quad --/--- \quad (-3^-,-\infty)$

$-3^+(-2.9) \quad --/-+- \quad (-3^-,+\infty)$

$0^-(-0.1) \quad +-/-+- \quad (0^-,-\infty)$

$0^+(0.1) \quad +-/++- \quad (0^-,+\infty)$

$1^-(0.9) \quad +-/++- \quad (1^-,+\infty)$

$1^+(1.1) \quad +-/+++ \quad (1^+,-\infty)$

$\frac{\sqrt{x^2}}{x^2}$

ASSÍNTOTAS HORIZONTAIS

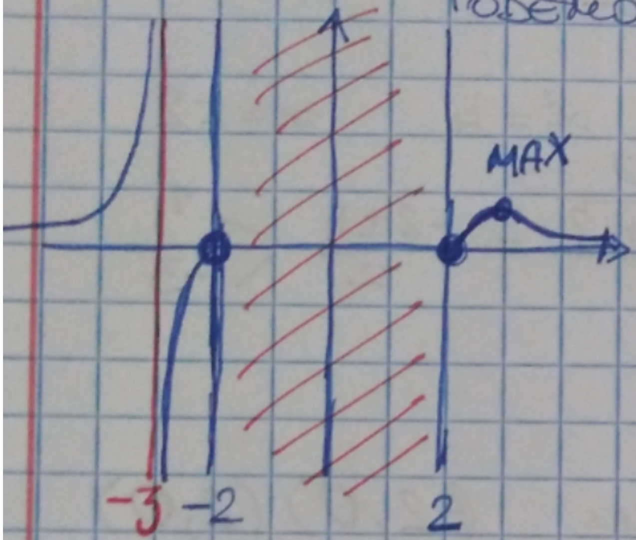
$x \to \pm\infty$

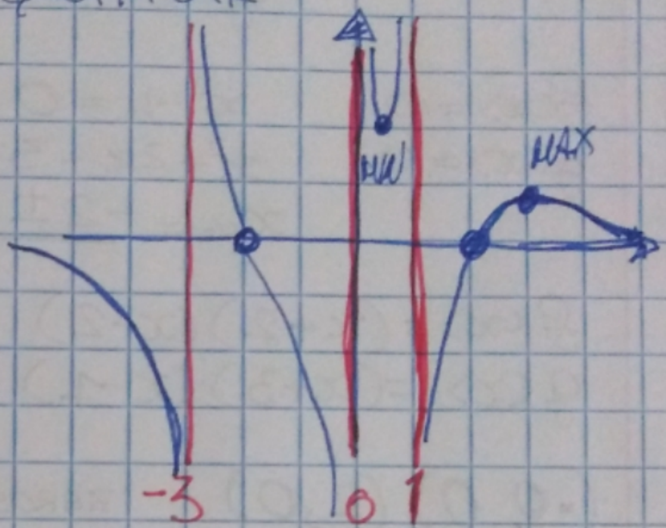
$\frac{x^2}{x^3}$

$(+\infty, 0^+)$
$(-\infty, 0^+)$

$(+\infty, 0^+)$
$(-\infty, 0^-)$

PODEMOS GRAFICAR





CALCULAMOS AGORA
AS DERIVADAS
PARA ENCONTRAR
A TANGENTE EM (2,0)
E SE POSSÍVEL MAX, MIN

$f(x) = x^2 - 4$
$g(x) = x^2 + 2x - 3$
$f'(x) = 2x$
$g'(x) = 2x + 2$

$$\frac{f'(x)g(x) - 2f(x)g'(x)}{2\sqrt{f(x)}\,g^2(x)}$$

$f(x) = x^2 - 4$
$G(x) = xg(x) = x^3 + 2x^2 - 3x$
$f'(x) = 2x$
$G'(x) = 3x^2 + 4x - 3$

$$\frac{f'(x)G(x) - f(x)G'(x)}{G^2(x)}$$

CALCULAMOS
ANTES O NUMERADOR

$2x(x^2 + 2x - 3) - 2(x^2 - 4)(2x + 2)$

$2x(x^3 + 2x^2 - 3x) - (x^2 - 4)(3x^2 + 4x - 3)$

$$\begin{array}{r} 2x^3+4x^2-6x \\ -4x^3-4x^2 \\ +16x+16 \\ \hline -2x^3 \quad +10x+16 \end{array}$$

$$\begin{array}{r} 2x^4+4x^3-6x^2 \\ -3x^4-4x^3+3x^2 \\ +12x^2+16x-12 \\ \hline -x^4 \quad +9x^2+16x-12 \end{array}$$

$$F'(x) = \frac{-2x^3+10x+16}{2\sqrt{x^2-4}\,(x+3)^2(x-1)^2}$$

$$F'(x) = \frac{-x^4+9x^2+16x-12}{(x+3)^2(x-1)^2}$$

TEMOS UMA EQUAÇÃO CÚBICA
E UMA DE ORDEM 4 VENDO
O GRÁFICO PODEMOS LIMITAR
MAX E MIN

1 MAX
DEPOIS $x=2$

1 MAX DEPOIS
DE $x=2$

1 MIN ENTRE
$x=0$ E $x=1$

TANGENTE EM $(2,0)$

$$y = F'(2)(x-2)+0$$

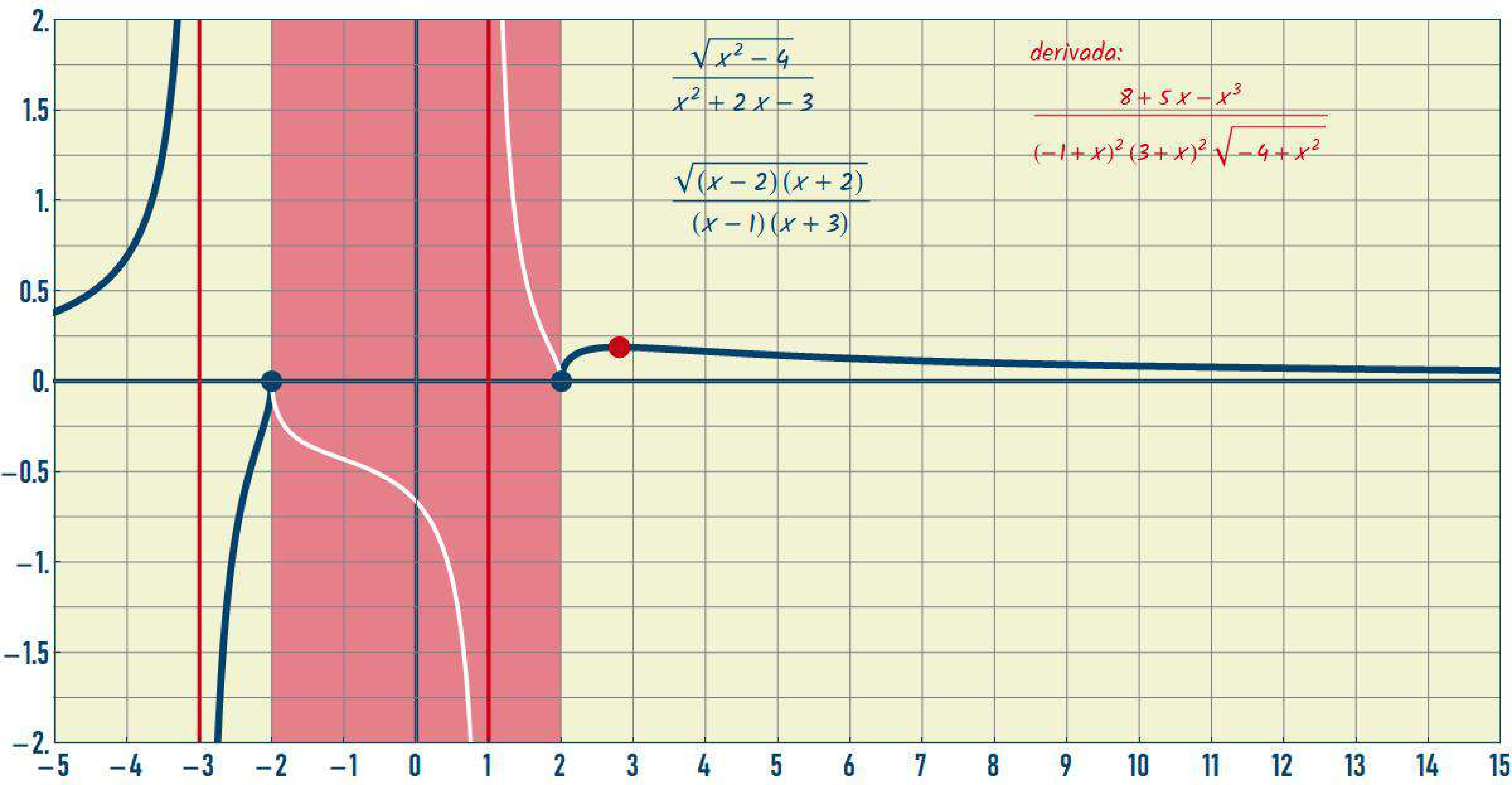
0 NO DENOMINADOR
NÃO TEMOS TANGENTE

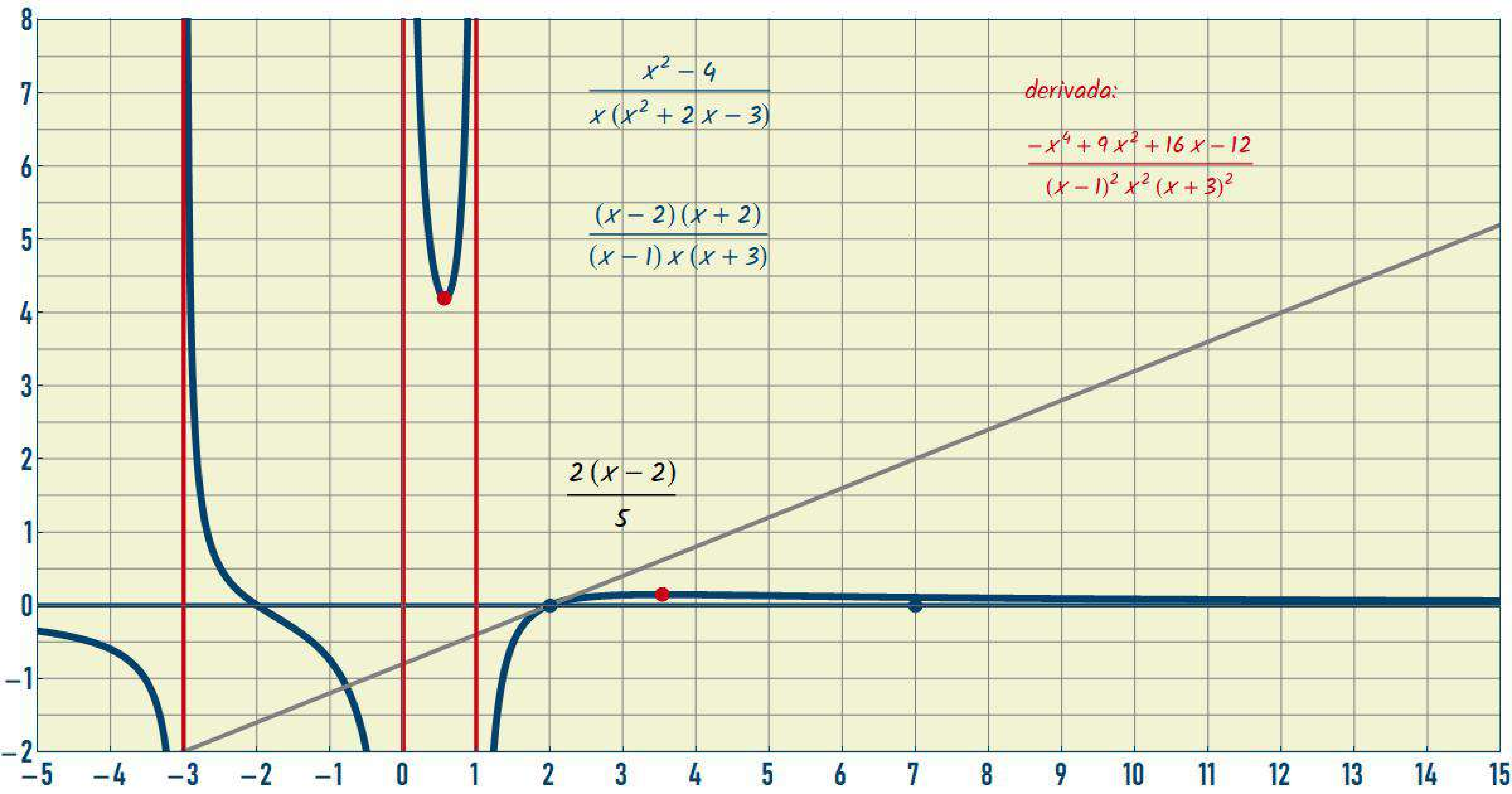
$$F'(2) = \frac{-16+36+32-12}{4\times 25} = \frac{40}{4\times 25} = \frac{8}{4\times 5} = \frac{2}{5}$$

$$y = \frac{2}{5}(x-2)$$

NA ZONA PROIBIDA
SE TROCARMOS O
SINAL NA RAIZ
TEREMOS O
SEGUINTE
GRÁFICO

NÃO TEMOS COMO
CONSTRUIR A TANGENTE!!!


$\dfrac{\sqrt{x^2-4}}{x^2+2x-3}$
$\dfrac{\sqrt{(x-2)(x+2)}}{(x-1)(x+3)}$
derivada:
$\dfrac{8+5x-x^3}{(-1+x)^2(3+x)^2\sqrt{-4+x^2}}$
2.
1.5
1.
0.5
0.
−0.5
−1.
−1.5
−2.
−5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15



$\frac{x^2-4}{x(x^2+2x-3)}$
$\frac{(x-2)(x+2)}{(x-1)x(x+3)}$
$\frac{2(x-2)}{5}$
derivada:
$\frac{-x^4+9x^2+16x-12}{(x-1)^2x^2(x+3)^2}$