

Exercício 3(b) da Lista 1

$$\gamma(t) = \left(\frac{3t}{1+t^3}, \frac{3t^2}{1+t^3} \right)$$

$$f(t) = \frac{3t}{1+t^3} \quad g(t) = \frac{3t^2}{1+t^3}$$

$$D_\gamma = \{ t \in \mathbb{R} \mid t \neq -1 \} =]-\infty, -1[\cup]-1, +\infty[$$

$$\lim_{t \rightarrow +\infty} f(t) = \lim_{t \rightarrow +\infty} g(t) = 0$$

$$\lim_{t \rightarrow -1^+} f(t) = \lim_{t \rightarrow -1^+} \frac{3t}{(t-1)(t^2-t+1)} = -\infty$$

(Annotations: 3t → -3, (t-1) → 0+, (t^2-t+1) → 1)

$$\lim_{t \rightarrow -1^-} f(t) = \lim_{t \rightarrow -1^-} \frac{3t}{(t^2-t+1)} \cdot \frac{1}{t-1} = +\infty$$

(Annotations: 3t → -3, (t^2-t+1) → 1, t-1 → 0-)

$$\lim_{t \rightarrow -1^+} g(t) = \lim_{t \rightarrow -1^+} \frac{3t^2}{(t^2-t+1)} \cdot \frac{1}{t-1} = +\infty$$

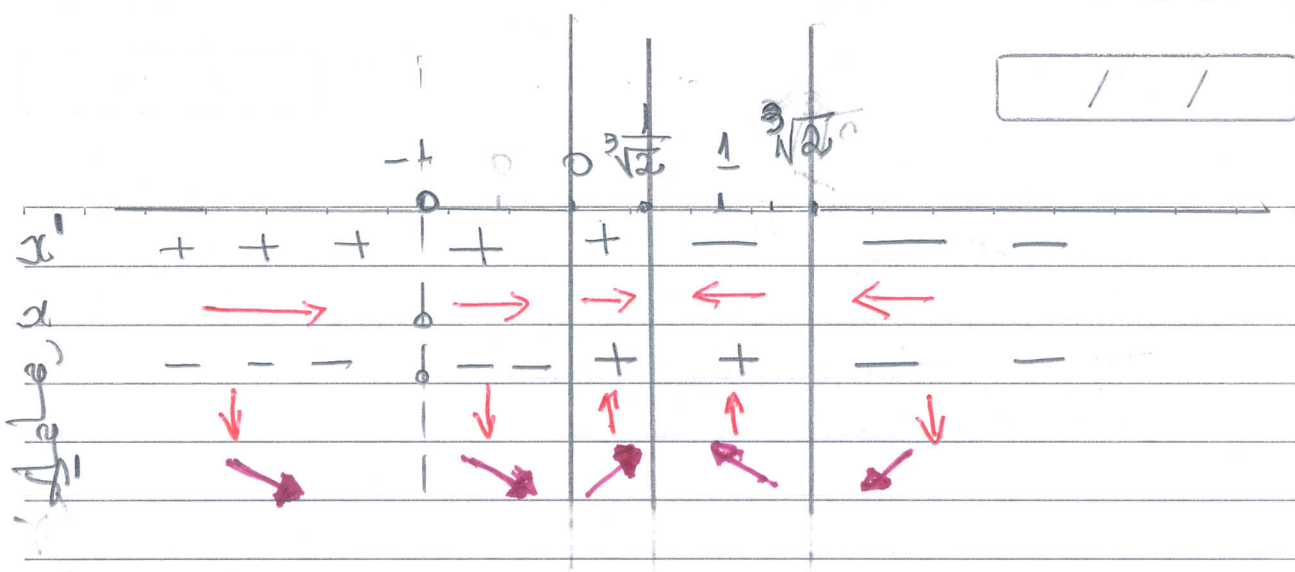
(Annotations: 3t^2 → 3, (t^2-t+1) → 1, t-1 → 0+)

$$\lim_{t \rightarrow -1^-} g(t) = \lim_{t \rightarrow -1^-} \frac{3t^2}{(t^2-t+1)} \cdot \frac{1}{t-1} = -\infty$$

(Annotations: 3t^2 → 3, (t^2-t+1) → 1, t-1 → 0-)

Estudar $\gamma'(t)$

$$\gamma'(t) = \left(\underbrace{\frac{3(1-2t^3)}{(1+t^3)^2}}_{x'}, \underbrace{\frac{3t(2-t^3)}{(1+t^3)^2}}_{y'} \right)$$



Concavidade

$$m(t) = \frac{g'(t)}{f'(t)} = \frac{2t - t^4}{1 - 2t^3}, \quad t \neq -1, t \neq \sqrt[3]{2}$$

$$m'(t) = \frac{2(t^3 + 1)^2}{1 - 2t^3} > 0$$

