TE février : À ajouter

2.10.1 ← Bernoulli - l'Hospital

2.10.2 ← Croissance

2.10.7 ← Courbure

2.10.8 ← Fun

$$\lim_{x \to 0} \frac{\sin x}{x} = \ll \frac{0}{0} \gg$$

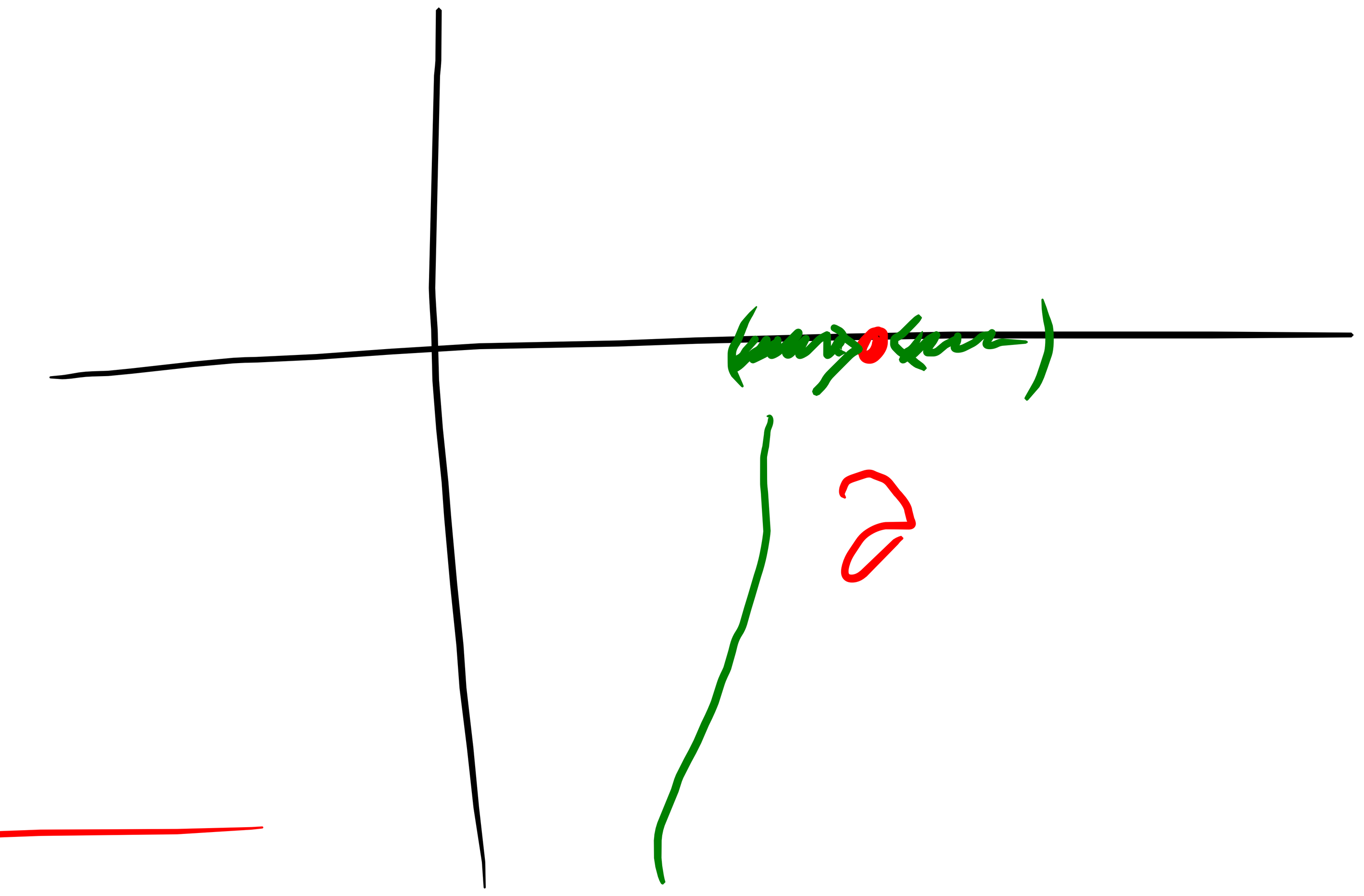
Rien à voir avec $\left(\frac{\sin x}{x}\right)'$

$$\sin' x = \cos x$$

$$\frac{(\sin x)'}{(x)'} = \frac{\cos x}{1} = \cos x \Big|_{x \to 0} = 1$$

$$\Rightarrow \lim_{x \to 0} \frac{\sin x}{x} = \lim_{x \to 0} \frac{\cos x}{1} = 1$$

$$\lim_{x \to a} \frac{f(x)}{g(x)} = « \frac{0}{0} »$$



Si $g'(x) \neq 0$ sur l'ensemble $]a-\varepsilon ; a[\cup]a ; a+\varepsilon[$

et que $\lim_{x \to a} \frac{f'(x)}{g'(x)} = c$

$$\Rightarrow \lim_{x \to a} \frac{f(x)}{g(x)} = c$$

$z = -7 + 24i$

$|z| = \sqrt{49 + 576} = \sqrt{625} = 25$

$\boxed{w = a+bi}$ tq $\boxed{w^2 = z}$

w est la racine carrée.

w est le carré du nombre cherché.

$|w^2| = |z| \iff |w|^2 = |z|$

$|w|^2 = \left(\sqrt{a^2+b^2}\right)^2 = 25 \iff \boxed{a^2+b^2 = 25}$

$\boxed{a^2 - b^2 = -7}$

$\boxed{2ab = 24}$

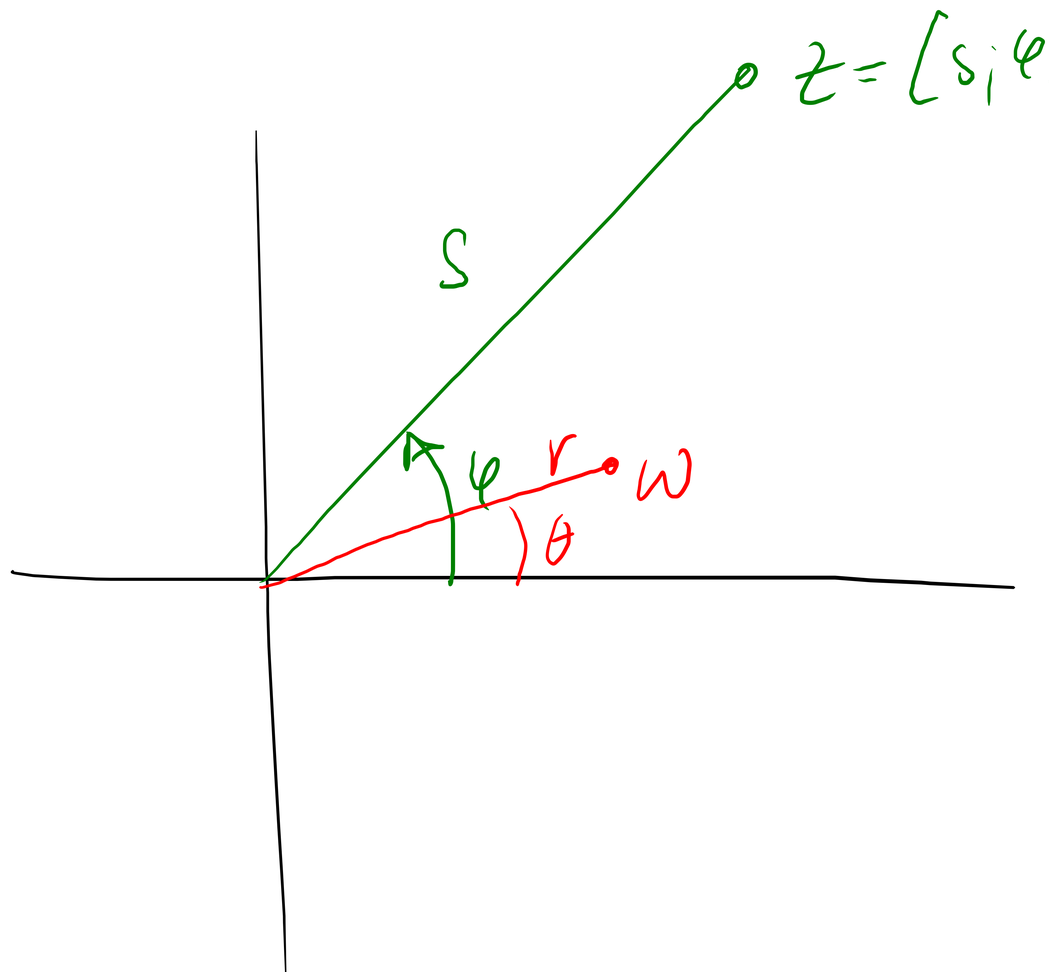
$w^2 = (a+bi)^2 = a^2 + 2abi + (bi)^2 = a^2 + 2abi - b^2 = \underbrace{a^2 - b^2}_{-7} + \underbrace{2ab}_{24} i$

$= -7 + 24$

$$w^n = z \quad \Leftrightarrow \quad w = \sqrt[n]{z}$$

$$w = [r; \theta] \qquad z = [s; \varphi]$$

$$\Rightarrow \quad [r^n; n\theta] = [s; \varphi]$$



$$r^n \left(\cos(n\theta) + i \sin(n\theta) \right) = s \left(\cos\varphi + i \sin\varphi \right)$$

$$\Rightarrow \quad r = \sqrt[n]{s} \qquad | \qquad n\theta = \varphi + k \cdot 2\pi \quad \Leftrightarrow \quad \theta = \frac{\varphi + k 2\pi}{n}$$

$$k = 0, 1, \ldots, n-1$$

$$\left(\sqrt[3]{x+4}\right)' = \left((x+4)^{\frac{1}{3}}\right)' = \frac{1}{3}(x+4)^{\frac{1}{3}-1} \cdot 1$$

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

$$2^{-p} = \frac{1}{2^p}$$

$$\frac{f'(x)}{g'(x)} = \frac{1}{\frac{1}{3}(x+4)^{-\frac{2}{3}}} = \frac{3}{(x+4)^{-\frac{2}{3}}} = \frac{3}{\left(\frac{1}{(x+4)^{\frac{2}{3}}}\right)} = 3\cdot(x+4)^{\frac{2}{3}}$$

$$= 3\sqrt[3]{(x+4)^2}$$

$$\downarrow x \to 4$$

$$\Rightarrow \lim_{x\to 4} \frac{f(x)}{g(x)} = 12$$

12

Etude d'une fonction

$\mathcal{D}_f$, zéros, signe de f

Asymptotes (A.H. / A.O / A.V.)

Croissance (tableau des signes de f')

Courbure (tableau des signes de f'')

Graphe

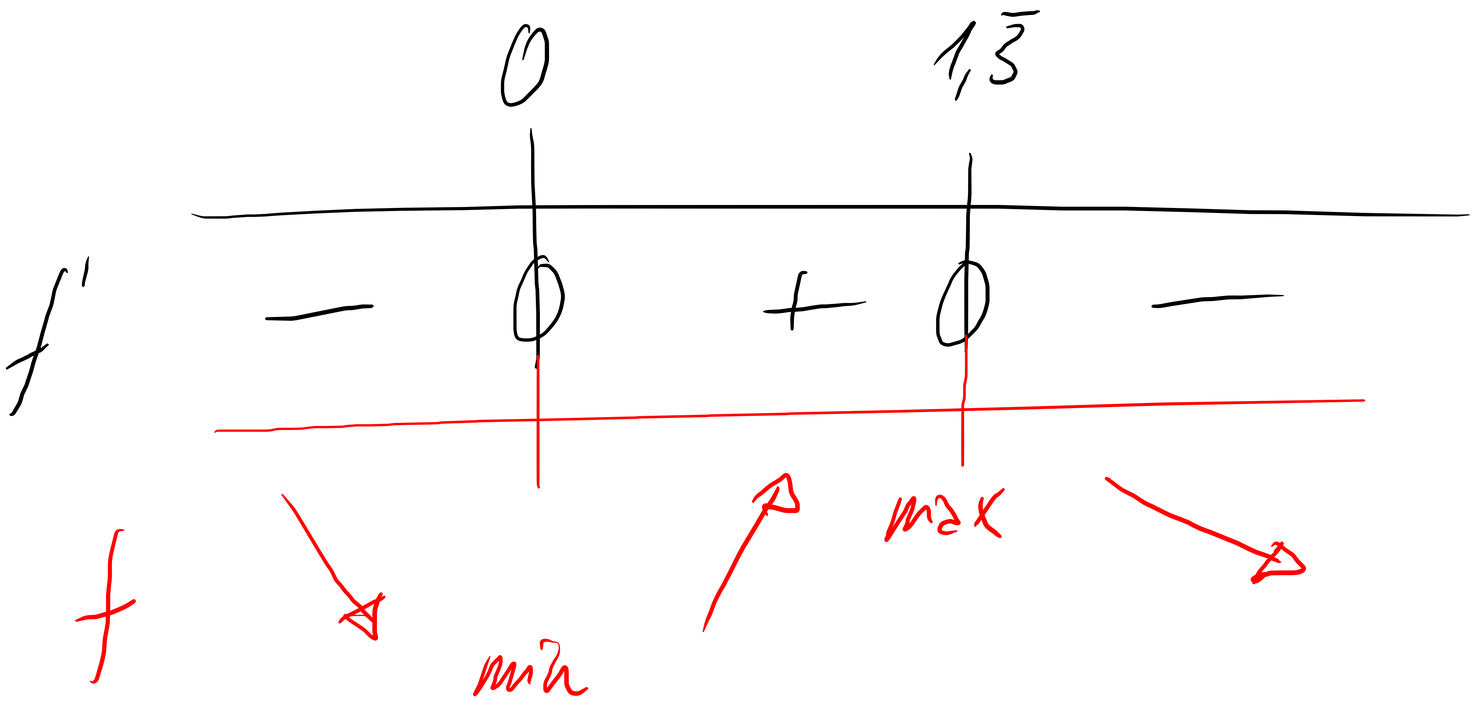
$$f(x) = 2x^2 - x^3$$

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

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

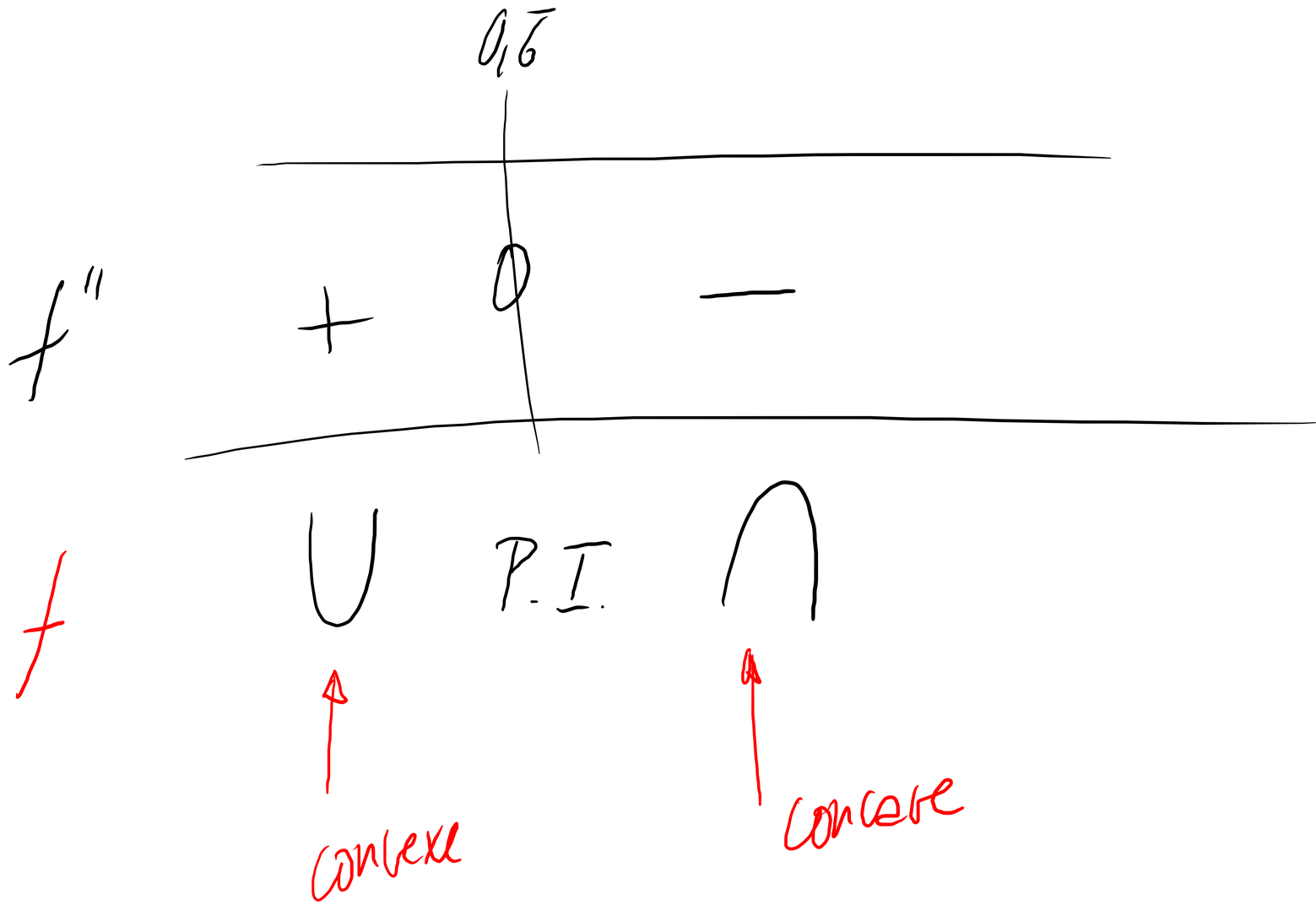
$x = 0 \qquad 4 = 3x \;/\; x = 4/3$

$D_{f'} = \mathbb{R}$



$$f''(x) = 4 - 6x$$

$$D_{f''} = \mathbb{R}$$



$$x \cdot \left(2 \operatorname{arctan} x - \pi\right) = \frac{2 \operatorname{arctan} x - \pi}{1/x}$$

$$\frac{2 \cdot \frac{1}{1+x^2}}{-\frac{1}{x^2}} = -2 \cdot \frac{x^2}{1+x^2} \longrightarrow -2$$

$x \to \infty$