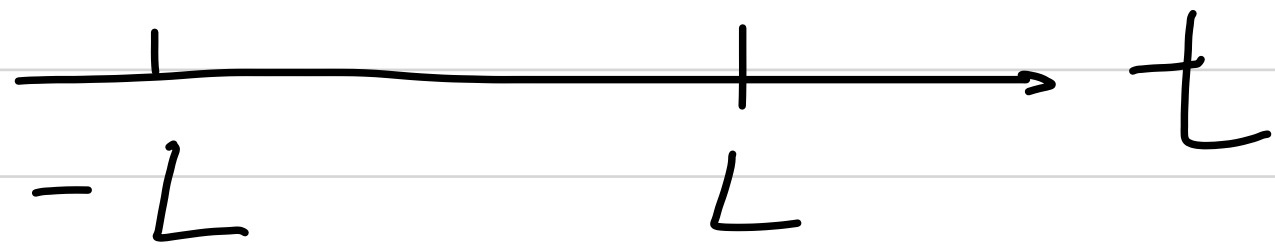
anla

CA4141

19 nov 21



$$x = \pi \longleftrightarrow t = L$$

$$t = \frac{Lx}{\pi}$$

ou

$$x = \frac{\pi}{L} t$$

$$\frac{a_0}{2} + \sum_{n=1} a_n \cos(nx) + b_n \sin(nx)$$

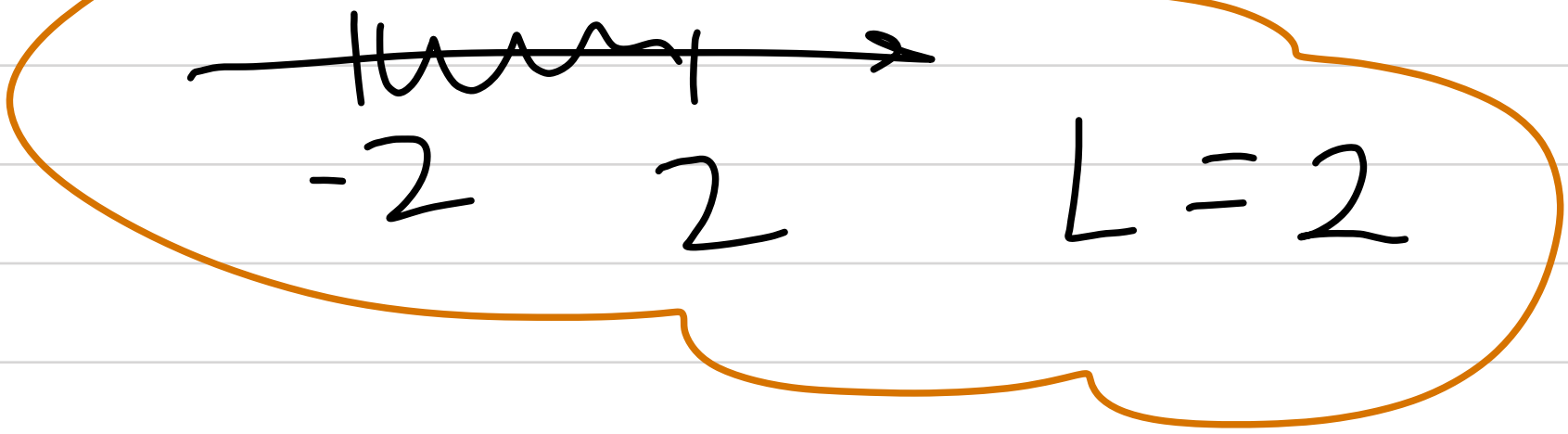
$$x = \frac{\pi t}{L}$$

$$\frac{a_0}{2} + \sum_{n=1} a_n \cos\left(\frac{n\pi t}{L}\right) + b_n \sin\left(\frac{n\pi t}{L}\right)$$

$$f(x) = x, \quad -2 \leq x < 2$$

$$\frac{a_0}{2} + \sum a_n \cos\left(\frac{n\pi}{2} x\right)$$

$$+ b_n \operatorname{sen}\left(\frac{n\pi}{2} x\right)$$



$f(x) = x$ é ímpar

$$f(-x) = -(x) = -f(x)$$

$$\Downarrow$$

$$a_n = 0 \quad \forall n \geq 0$$

$$b_n = \frac{1}{L}\int_{-2}^{2} f(x)\,\text{sen}\left(\frac{n\pi x}{2}\right)dx$$

$f(x) = x$

ímpar ímpar

$x\,\text{sen}\left(\frac{n\pi x}{2}\right) \rightarrow$ par

Simetria

$$b_n = \frac{1}{2}\cdot 2\int_{0}^{2} x\,\text{sen}\left(\frac{n\pi x}{2}\right)dx$$

$$\int \operatorname{sen}(\alpha x)\,dx = -\frac{\cos(\alpha x)}{\alpha} + c$$

$$\int \cos(\alpha x)\,dx = \frac{\operatorname{sen}(\alpha x)}{\alpha} + c$$

$$\int x \operatorname{sen}\left(\frac{n\pi x}{2}\right) dx$$

A T L I

$u = x$

$du = dx$

T E

$$dv = \operatorname{sen}\left(\frac{n\pi x}{2}\right) dx$$

$$v = \int \operatorname{sen}\left(\frac{n\pi x}{2}\right) dx = -\frac{\cos\left(\frac{n\pi x}{2}\right)}{\left(\frac{n\pi}{2}\right)}$$

α

$\Rightarrow$

$$\int \overbrace{x}^{u} \sin\left(\frac{n\pi x}{2}\right) \overbrace{dx}^{dv} = u(v) - \int v\,du$$

$$\begin{cases} du = dx \\ v = -\dfrac{2}{n\pi}\cos\left(\dfrac{n\pi x}{2}\right) \end{cases}$$

$$= \overbrace{x}^{u}\left[-\frac{2}{n\pi}\overbrace{\cos\left(\frac{n\pi x}{2}\right)}^{v}\right] - \left(-\frac{2}{n\pi}\right)\cos\left(\frac{n\pi x}{2}\right)\frac{d\mu}{dx}\,dx$$

$$= -\frac{2x}{n\pi}\cos\left(\frac{n\pi x}{2}\right) + \left(\frac{2}{n\pi}\right)\int \cos\left(\overbrace{\frac{n\pi x}{2}}^{\alpha}\right)dx$$

$$= -\frac{2x}{n\pi}\cos\left(\frac{n\pi x}{2}\right)$$

$$+\frac{2}{n\pi}\sin\left(\frac{n\pi y}{2}\right)\cdot\frac{2}{n\pi}$$

$$= \frac{2}{n\pi}\left[-x\cos\left(\frac{n\pi x}{2}\right)+\frac{2}{n\pi}\sin\left(\frac{n\pi x}{2}\right)\right]$$

$$+C$$

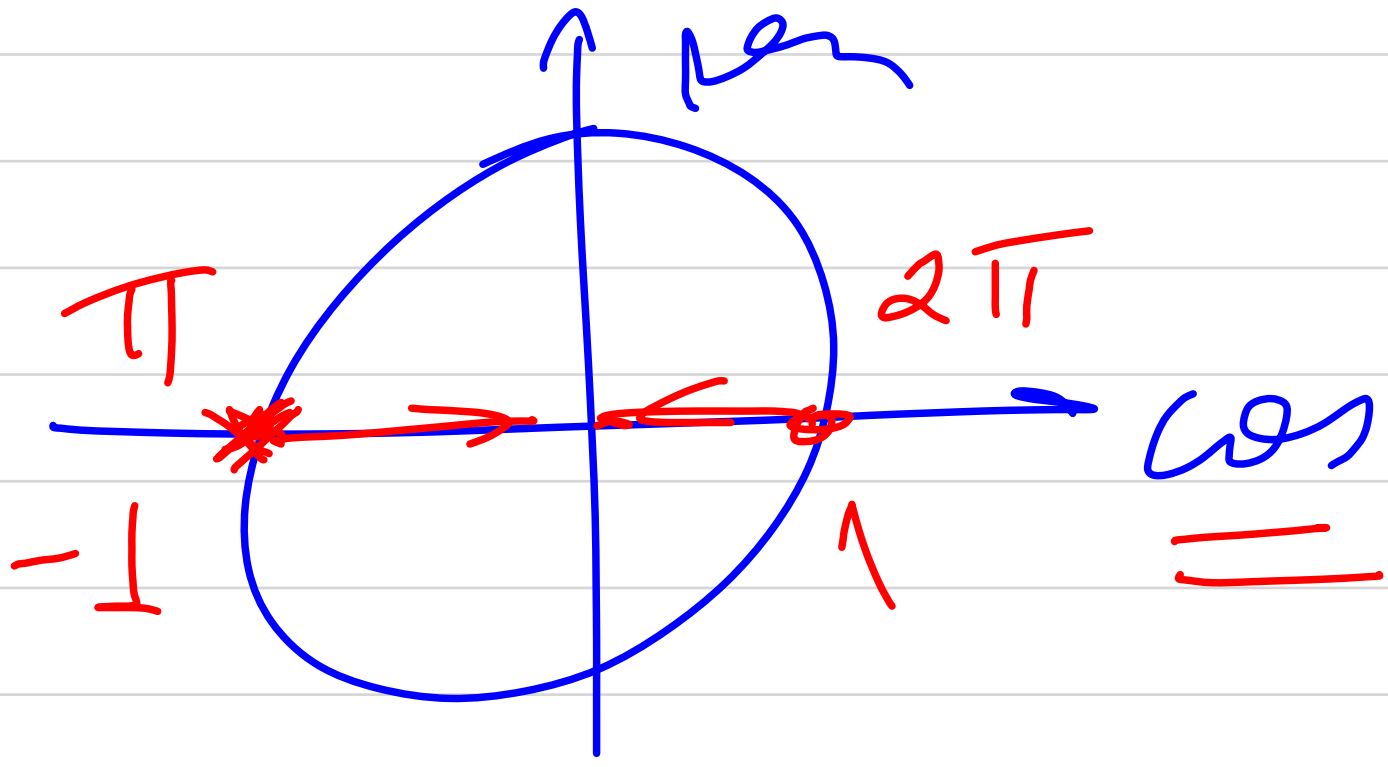
$$b_n = \frac{2}{n\pi}\left[\cdots\right]_0^2$$

$$b_n = \frac{2}{n\pi}\left[-2\cos\left(\frac{n\pi}{2}\cdot 2\right)+\frac{2}{n\pi}\sin\left(\frac{n\pi}{2}\cdot 2\right)\right]$$

$x=2$

$$b_n = \frac{4}{n\pi}\left[-\cos(n\pi) + \frac{1}{n\pi}\sin(n\pi)\right]$$

$\sin(n\pi) = 0$



$$\begin{cases} \cos(n\pi) = 1, & n \text{ par} \\ \cos(n\pi) = -1, & n \text{ ímpar} \end{cases}$$

$$b_n = -\frac{4\cos(n\pi)}{n\pi}, \quad n \geq 1$$

$$(-1)(-1)^n$$

$$\begin{cases} n \text{ par} \Rightarrow b_n = -\dfrac{4}{n\pi} \cdot 1 \\ n \text{ ímpar} \Rightarrow \begin{cases} b_n = -\dfrac{4}{n\pi} \cdot (-1) \\ b_n = \dfrac{4}{n\pi} \end{cases} \end{cases}$$

$$b_1 = \frac{4}{\pi}$$

$$b_2 = -\frac{4}{2\pi}$$

$$b_3 = \frac{4}{3\pi}$$

$$b_4 = -\frac{4}{4\pi}$$

Série de Fourier

$$\sum_{n=1}^{\infty} b_n \operatorname{sen}\left(\frac{n\pi x}{2}\right)$$

$n=1$ $\quad$ $n=1$ $\quad$ $n=2$

$$= b_1 \operatorname{sen}\frac{\pi x}{2} + b_2 \operatorname{sen}\left(\frac{2\pi x}{2}\right)$$

$b_1 = \frac{4}{\pi}$ $\quad$ $b_2 = \frac{-4}{2\pi}$ $\quad$ $n=3$

$$+ b_3 \operatorname{sen}\left(\frac{3\pi x}{2}\right)$$

$b_3 = \frac{4}{3\pi}$

$$+ b_4 \operatorname{sen}\left(\frac{4\pi x}{2}\right)$$

$b_4 = -\frac{4}{4\pi}$

$$+ \cdots$$

$$= \frac{4}{\pi} \sin\left(\frac{\pi x}{2}\right) - \frac{4}{2\pi} \sin\left(\frac{2\pi x}{2}\right)$$

$$+ \frac{4}{3\pi} \sin\left(\frac{3\pi x}{2}\right)$$

$$- \frac{4}{4\pi} \sin\left(\frac{4\pi x}{2}\right)$$

$$+ \cdots$$

$$= \frac{4}{\pi}\left[\sin\left(\frac{\pi x}{2}\right) - \frac{1}{2}\sin\left(\frac{2\pi x}{2}\right)\right.$$

$$+ \frac{1}{3}\sin\left(\frac{3\pi x}{2}\right)$$

$$\left. - \frac{1}{4}\sin\left(\frac{4\pi x}{2}\right) + \cdots\right]$$

a) $\sum c_n x^n \rightarrow a = 0$

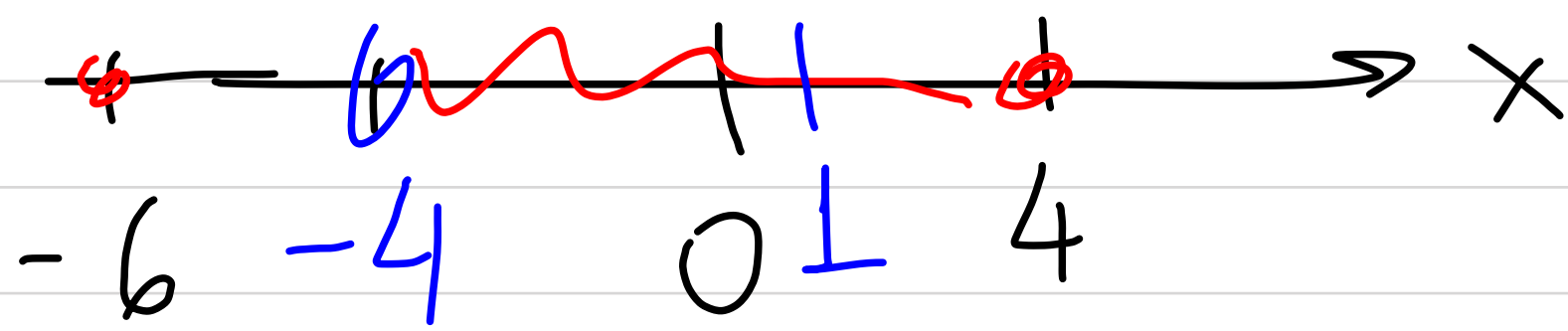
converge p/ $x = 4$

diverge p/ $x = -6$

$\Downarrow$

$\sum c_n \rightarrow x = 1$ converge? ✓

d — — c



$\sum c_n (-4)^n$

$\sum c_n 1^n$ ↑

$x = 1$

$2-3(x-2)-5(x-2)^3+4(\ )^3$

$y = 2-3(x-2)$

$y = 2-3x+6$

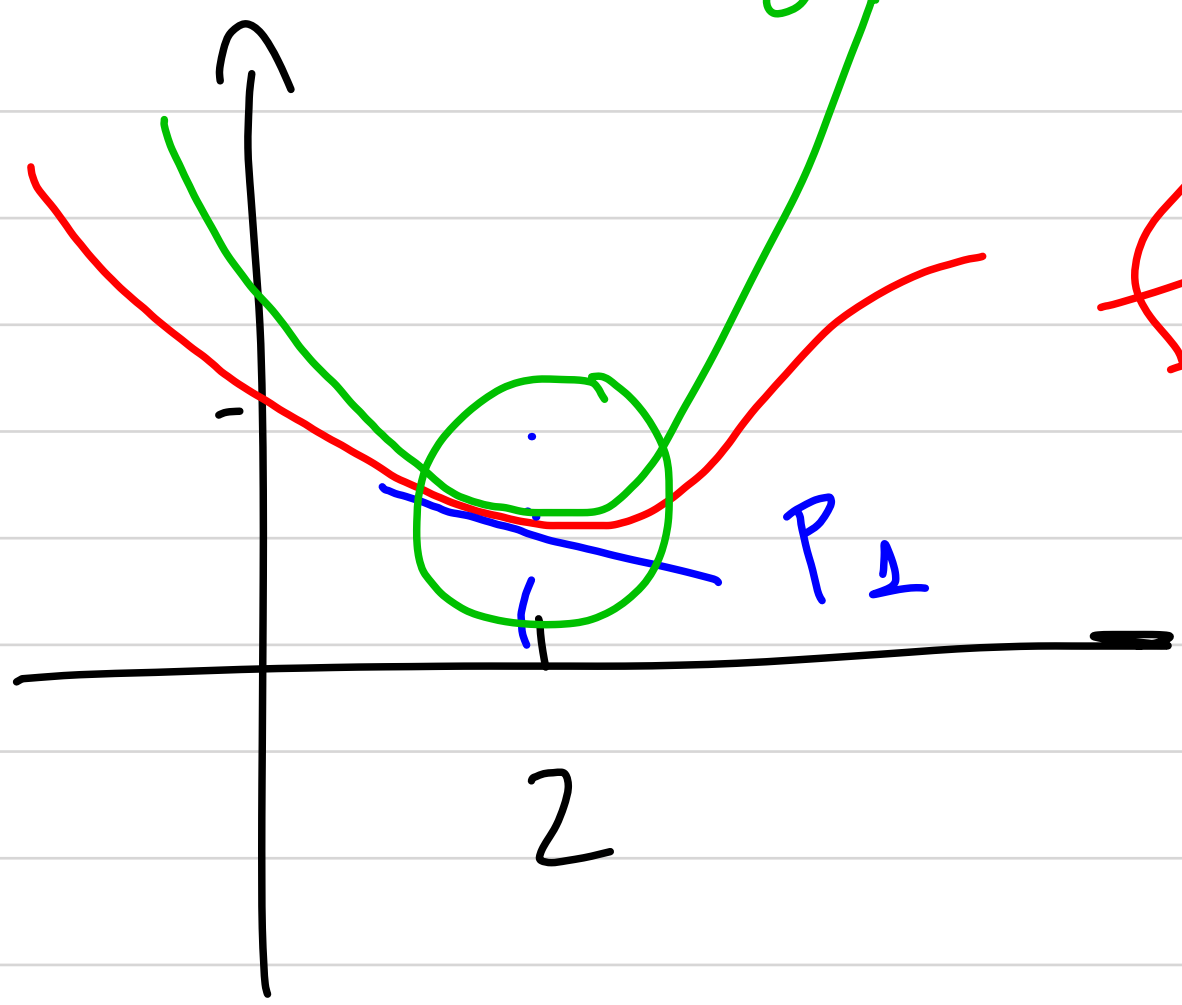
$y = -3x+8$ OK

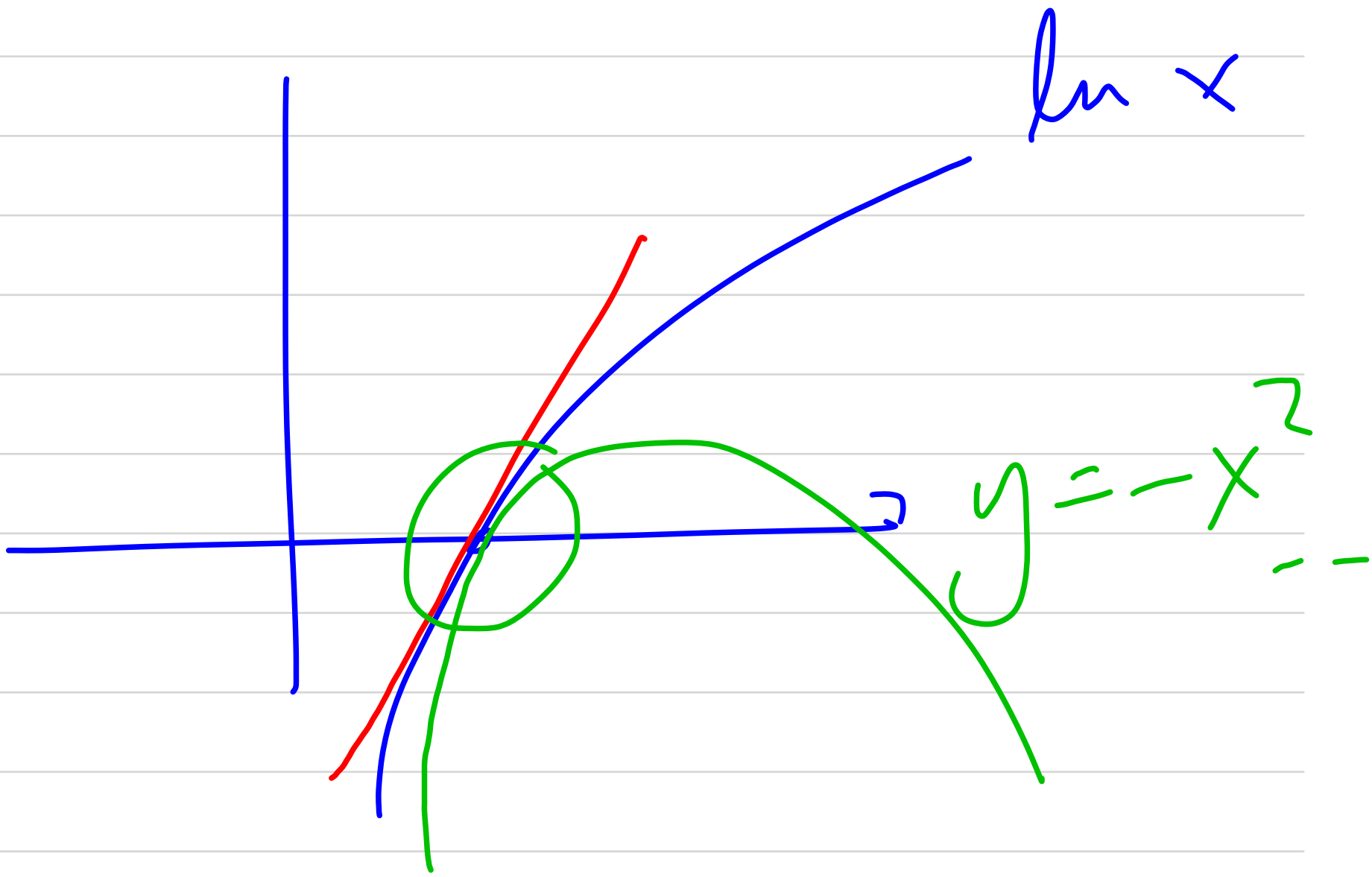
↳ decrescente

reta F

$y = 2-3(x-2)-5(x-2)^2$

$y = -5x^2+\dots$


y = 5x² + ..
f
P₁
1
2


ln x
y = −x²

$\sum a_n$ div

$\sum c \cdot a_n$ div

$c \in \mathbb{R}$

F

$c \neq 0$