n° 86-85 p 1779
p 1780 prove di VERIFICA

p 1785 Funzioni POLINOMIALI

$y = f(x)$

$y = a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$

- C.E $\mathbb{R}$
- NO pt DISCONTINUITÀ
- NO ASINTOTI in generale

PARI? Simmetriche ASSE Y

DISPARI? Simmetriche ORIGINE

$y = 2x^3 - 4x - 1$ C.E $\mathbb{R}$

LIMITI

$$\lim_{x \to +\infty} x^3\left(2 - \frac{4}{x^2} - \frac{1}{x^3}\right) = +\infty$$

$$\lim_{x \to -\infty} x^3\left(2 - \frac{4}{x^2} - \frac{1}{x^3}\right) = -\infty$$

INTERSEZIONI

$A(0;-1)$

$$\begin{cases} y = 0 \\ 2x^3 - 4x - 1 = 0 \end{cases}$$

(RUFFINI non è fattibile)

→ interseca 0 1 o 3 soluzioni → polinomi di GRADI dispari hanno soluzioni DISPARI

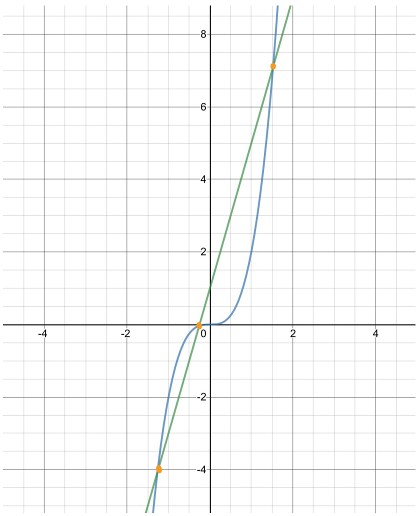
$2x^3 = 4x + 1$ → ZERI $y = f(x)$ sono le INTERSEZIONI tra le 2 curve

↓

3 Intersezioni

↓

$(x - x_1)(x - x_2)(x - x_3)$



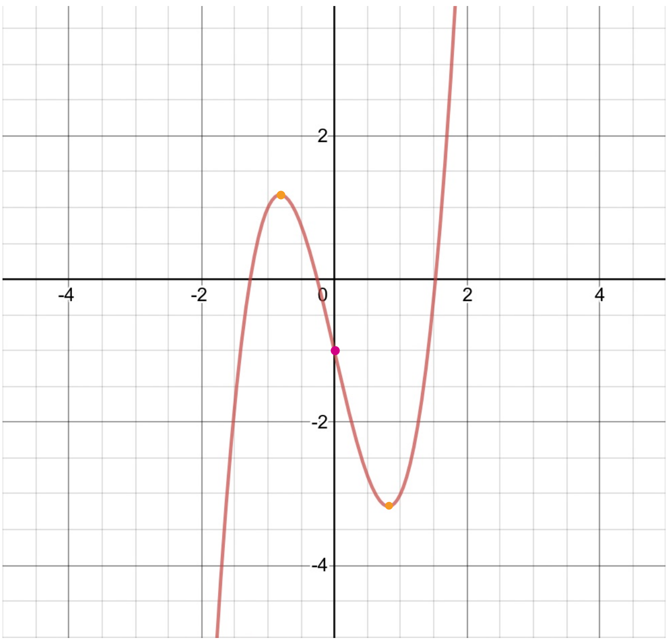
DERIVATA

$y = 2x^3 - 4x - 1$ $y' = 0 \rightarrow 6x^2 - 4 = 0$ $x = \pm\sqrt{\dfrac{2}{3}}$

$y' = 6x^2 - 4$ $x^2 = \dfrac{2}{3}$

$y' > 0$ $-\sqrt{\dfrac{2}{3}}$ $+\sqrt{\dfrac{2}{3}}$

$\nearrow$ $\searrow$ $\nearrow$



$y' = 6x^2 - 4$ $y'' = 0$ $x = 0$

$y'' = 12x$

1 FLESSO
$(0; -1)$

SIMMETRICA rispetto al FLESSO

$\begin{cases} y' = y + 1 \\ x' = x \end{cases}$ $\begin{cases} y = y' - 1 \\ x = x' \end{cases}$

$y - 1 = 2x^3 - 4x - 1$

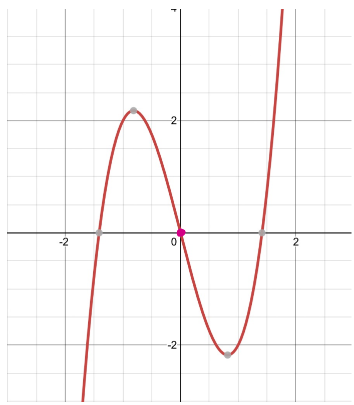
$y = 2x^3 - 4x$

$y = 2x^3 - 4x$ é DISPARI ?

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

$-2x^3 + 4x = -2x^3 + 4x$

↳ SIMMETRICA rispetto all'ORIGINE



p1785 funzioni RAZIONALI

$y = 1+\frac{1}{x}$ $\qquad y=\frac{x+1}{x}$

$y = \frac{\text{polinomio}}{\text{polinomio}} = \frac{a_0x^n+\dots+a_n}{b_0x^m+\dots+b_m}$

C.E $x \neq \dots$ $\qquad x \in (\ ) \cup (\ )$

ASINTOTI non sempre se abbiamo $x \neq n$ in n ho un ASINTOTO

$y=\frac{f(x)}{g(x)}$
$\longrightarrow$ ORIZZ $n=m$
$\longrightarrow$ VERTICALE $x \neq \dots$
$\longrightarrow$ OBLIQUI $n=m+1$

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n°86 $\quad y=\frac{x^2+1}{x^2-9}$

ASINTOTI $\quad x=\pm 3$
$y=1$

PARI $\quad f(x)=f(-x) \to$ studiamo $x \in [0;+\infty)$

LIMITI

$\lim_{x\to 3^-} f(x) \ \frac{x^2+1}{x^2-9} = \frac{10}{0^-} = -\infty$

$\lim_{x\to 3^+} f(x) \ \frac{x^2+1}{x^2-9} = \frac{10}{0^+} = +\infty$

$\lim_{x\to \infty} f(x) \ \frac{x^2+1}{x^2-9} = 1$

SEGNO

$\frac{x^2+1}{x^2-9}>0 \quad \begin{cases} x^2>-1 \\ x^2>9 \end{cases} \quad \begin{cases} \forall x \in \mathbb{R} \\ -3<x<3 \end{cases}$

-3 3

\+ - +

DERIVATA

$y' = \frac{2x^3-18x-2x^3-2x}{(x^2-9)^2} = \frac{-20x}{(x^2-9)^2}$

$y'=0 \quad -20x=0 \quad P(0;-\frac{1}{9})$
$\hookrightarrow$ massimo

$y'>0 \quad \begin{cases} x<0 \\ x\neq \pm 3 \end{cases}$

0 3

$\nearrow \searrow \searrow$

DERIVATA"

$y'' = \frac{-20x^4-1620+360x^2+80x^4-720x^2}{(x^2-9)^4} =$

$y''=0 \quad 60x^4-360x^2-1620=0 \longrightarrow 3x^4-18x^2-81=0$

	3	0	-18	0	-81
-3		+9	27	+27	81
	3+9	9	+27	0	

$(x-3)(3x^3-9x^2+9x-27)$

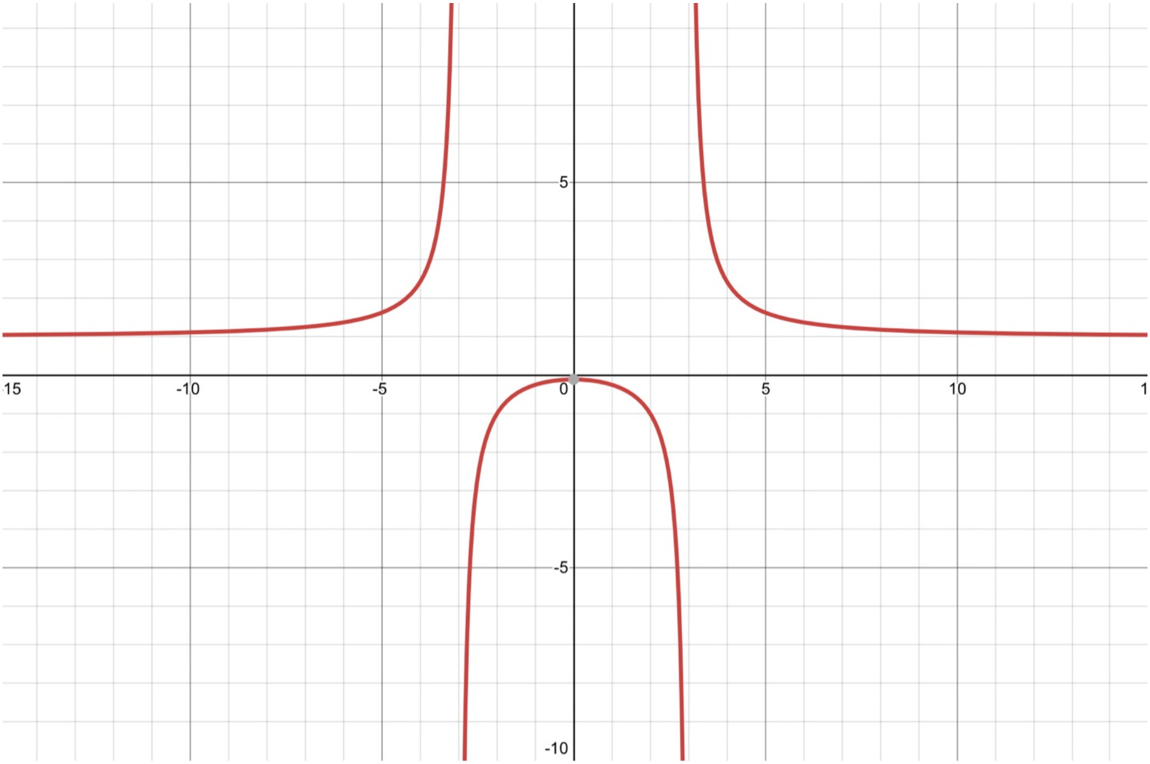
$(3x^2+9)(x-3)(x+3)$

$y''>0 \quad \frac{(x^2+3)(x^2-9)}{(x^2-9)^4} \quad \frac{(x^2+3)}{(x^2-9)^3} \quad \forall x \in \mathbb{R}$

$x<-3 \vee x>3$

-3 3

$\cup \quad \cap \quad \cup$



5
-5
-10
15
-10
-5
0
5
10
1

$$y = 3x^4 + 4x^3 + 1$$

$y = \frac{x^3}{9-x^2}$ MI ASPETTO AS OBLIQUO
2 AS VERTICALI

LIMITI

$\boxed{\text{Sottelo a coso doi...}}$

P1809
P1813

$y = x\sqrt{x+3}$ C.E $x \geq -3$

P1814

LIMITI

$\lim_{x \to -3^+} = 3\sqrt{0^+} =$