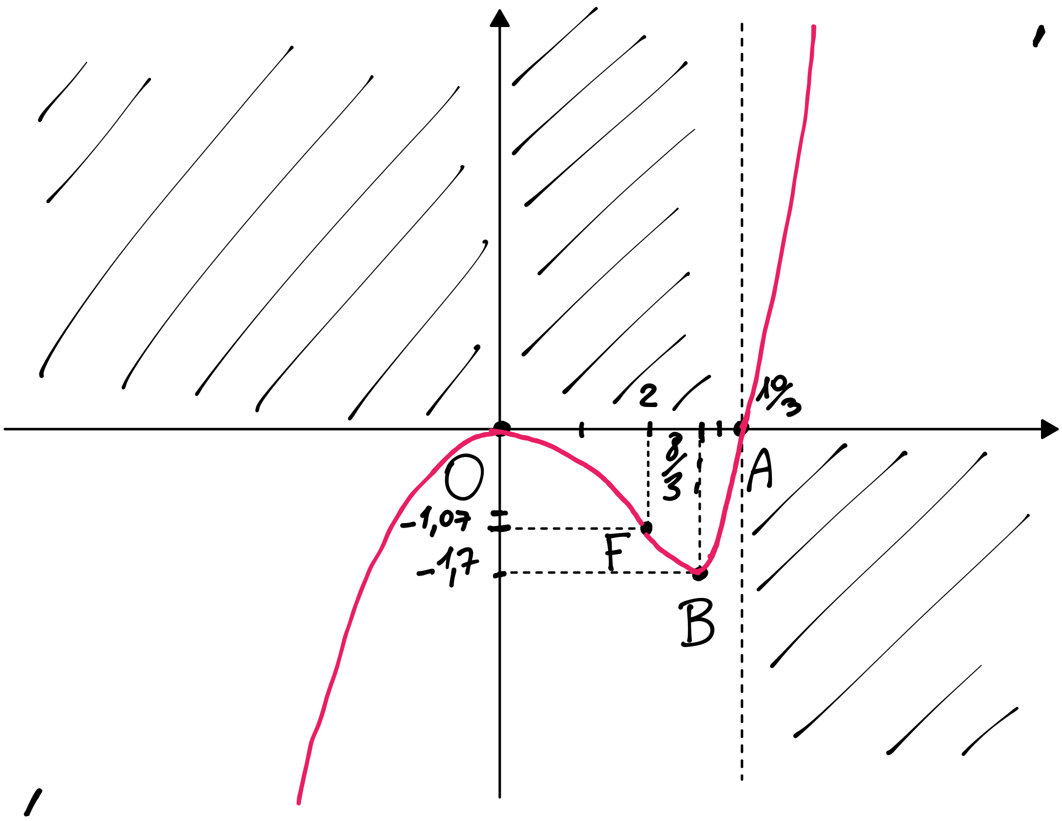
3/5/2019

# STUDIO COMPLETO DI FUNZIONE

$$\boxed{y = \frac{1}{20}x^5 - \frac{1}{6}x^4}$$

1) DOMINIO $= \mathbb{R} = (-\infty, +\infty)$




## 2) INTERSEZIONI CON GLI ASSI

INT. ASSE X

$$\begin{cases} y = \frac{1}{20}x^5 - \frac{1}{6}x^4 \\ y = 0 \end{cases} \Rightarrow \frac{1}{20}x^5 - \frac{1}{6}x^4 = 0 \qquad x^4\left(\frac{1}{20}x - \frac{1}{6}\right) = 0$$

$$x^4 = 0 \quad \vee \quad \frac{1}{20}x - \frac{1}{6} = 0$$

$$\Downarrow$$

$$x = 0 \qquad \frac{1}{20}x = \frac{1}{6}$$

$$x = \frac{20}{6} = \frac{10}{3}$$

$A\left(\frac{10}{3}, 0\right) \quad O(0,0)$

INT. ASSE y

$$\begin{cases} y = \frac{1}{20}x^5 - \frac{1}{6}x^4 \\ x = 0 \end{cases} \Rightarrow O(0,0) \text{ (già trovato)}$$

## 3) STUDIO DEL SEGNO

$$\frac{1}{20}x^5 - \frac{1}{6}x^4 > 0 \Rightarrow x^4\left(\frac{1}{20}x - \frac{1}{6}\right) > 0$$

$$\Downarrow$$

$$\frac{1}{20}x - \frac{1}{6} > 0 \Rightarrow x > \frac{10}{3}$$

## 4) LIMITI AGLI ESTREMI DEL DOMINIO

$D = (-\infty, +\infty)$

$$\lim_{x \to -\infty} \left(\frac{1}{20}x^5 - \frac{1}{6}x^4\right) = \lim_{x \to -\infty} \underbrace{x^4}_{+\infty}\underbrace{\left(\underbrace{\frac{1}{20}x}_{-\infty} - \frac{1}{6}\right)}_{-\infty} = -\infty$$

$$\lim_{x \to +\infty} \left(\frac{1}{20}x^5 - \frac{1}{6}x^4\right) = +\infty$$

## 5) ASINTOTI

$$m = \lim_{x \to \pm\infty} \frac{f(x)}{x} = \lim_{x \to \pm\infty} \frac{\frac{1}{20}x^5 - \frac{1}{6}x^4}{x} = \lim_{x \to \pm\infty} \left(\frac{1}{20}x^4 - \frac{1}{6}x^3\right) = +\infty$$

NON CI SONO ASINTOTI OBLIQUI

## 6) STUDIO DERIVATA PRIMA

$$y = \frac{1}{20}x^5 - \frac{1}{6}x^4 \qquad y' = \frac{5}{20}x^4 - \frac{4}{6}x^3$$

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

## 6 a) PUNTI STAZIONARI

CANDIDATI MAX, MIN, ...

$$y' = 0 \Rightarrow \frac{1}{4}x^4 - \frac{2}{3}x^3 = 0 \qquad x^3\left(\frac{1}{4}x - \frac{2}{3}\right) = 0$$

$$x^3 = 0 \Rightarrow x = 0$$

$$\frac{1}{4}x = \frac{2}{3} \Rightarrow x = \frac{8}{3}$$

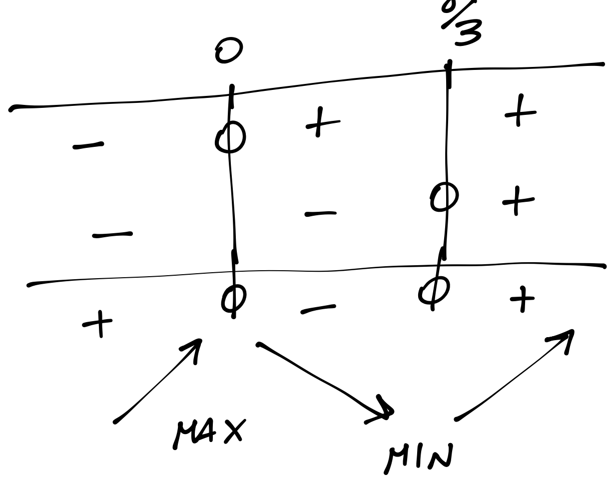
6b) SEGNO DERIVATA

$$\frac{1}{4}x^4 - \frac{2}{3}x^3 > 0 \qquad x^3\left(\frac{1}{4}x - \frac{2}{3}\right) > 0$$

$\boxed{1}$ $\boxed{2}$

$\boxed{1}$ $x^3 > 0 \Rightarrow x > 0$

$\boxed{2}$ $\frac{1}{4}x - \frac{2}{3} > 0 \Rightarrow x > \frac{8}{3}$




PUNTI DEL GRAFICO CORRISPONDENTI AI MAX E MIN

$O(0,0) \qquad B\left(\frac{8}{3}, -1{,}7\right)$

DA CALCOLARE (SOSTITUENDO ALLA x NELLA FUNZIONE)

$$y = \frac{1}{20}\left(\frac{8}{3}\right)^5 - \frac{1}{6}\left(\frac{8}{3}\right)^4 \simeq -1{,}7$$

7) STUDIO DERIVATA SECONDA

$$y' = \frac{1}{4}x^4 - \frac{2}{3}x^3 \Rightarrow y'' = x^3 - 2x^2$$

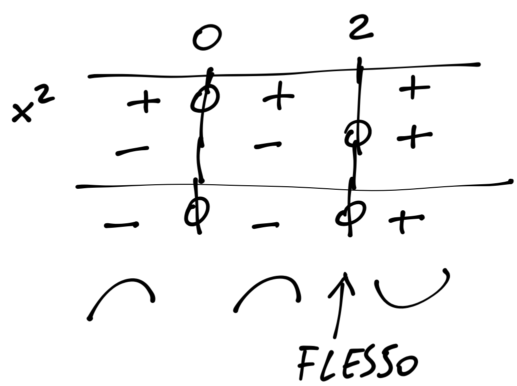
7a) ZERI DER. SEC.

$$x^3 - 2x^2 = 0 \Rightarrow x^2(x-2) = 0$$

$x = 0$ (È GIÀ MAX) $\qquad x = 2$ CANDIDATO FLESSO

7b) SEGNO DER. SEC.

$$x^3 - 2x^2 > 0 \Rightarrow x^2(x-2) > 0$$



$x = 2$ é PUNTO DI FLESSO

↓

Il corrispondente punto del grafico si trova sostituendo $x = 2$ alla funzione $y = \frac{1}{20}x^5 - \frac{1}{6}x^4$

$$y = \frac{1}{20} \cdot 2^5 - \frac{1}{6} \cdot 2^4 = \frac{32}{20} - \frac{16}{6} = \frac{8}{5} - \frac{8}{3} =$$

$$= \frac{24 - 40}{15} = -\frac{16}{15} \simeq -1,07$$

$F(2, -1,07)$

GRAFICO CON GEOGEBRA