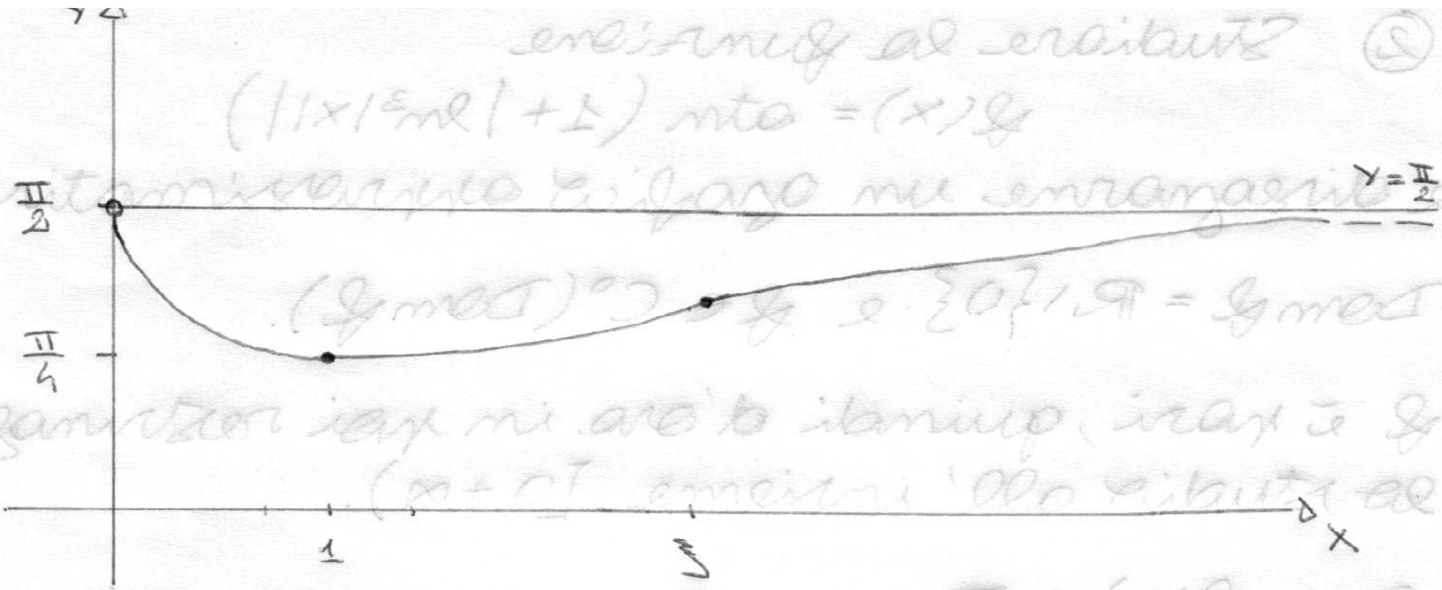

• Se $x\in(0,+\infty)\setminus\{1\}$ f è derivabile con continuità due volte in x e:

$$f''(x) = \frac{3x^{-2}}{\left(1+(1+|\ln^3|x||)^2\right)^2}\left\{\frac{2}{x}|\ln x|\, g(x) +\right.$$

$$(g(x))^2$$

$$\left. - \ln x|\ln x|\, g'(x)\right\} =$$

$$= \frac{3|\ln x|}{g^2(x)}\left\{2 + 2(1+|\ln^3 x|)^2 - \ln x\,(1+|\ln^3 x|)^2 - 3|\ln x|^3\right\}$$

$$= \frac{3|\ln x|}{g^2(x)}\left\{-\ln^7 x + 2\ln^6 x - 2|\ln x|^3 \ln x + |\ln x|^3 + - \ln x + 4\right\} = \frac{3|\ln x|}{g^2(x)}\cdot h(x)$$

Da cui $\lim_{x\to 1} f''(x) = 0$

Se $x\in(0,1)$: $\ln x < 0 \Rightarrow f''(x) \geq \frac{3|\ln x|^7}{g^2(x)}(2-\ln x)$

da cui $f''(x)>0 \Rightarrow f$ convessa se $x\in(0,1)$.

Poiché $h(1)=4 \Rightarrow h(x)>0$ in un intorno di 1

$\Rightarrow f''(x)>0$ $x\in(0,1+\delta)\setminus\{1\}$, essendo $\lim_{x\to+\infty} f'' = 0^-$

$\exists\, \xi\in(1,+\infty): f''(\xi)=0$.