$$f(x) = x^2 e^{-x}$$

CE: $\mathbb{R}$

Positività: $f(x) > 0 \quad \forall x \neq 0$

Intersezione con gli assi

asse y $\quad x = 0 \Rightarrow y = 0 \cdot e^0 = 0$

asse x $\quad y = 0 \Rightarrow x = 0$

~~MAX E MIN~~

$$\lim_{x \to -\infty} x^2 e^{-x} = \lim_{x \to -\infty} \frac{x^2}{+\infty}$$

$$m = \lim_{x \to -\infty} x e^{-x} = +\infty$$

$$\lim_{x \to +\infty} x^2 e^{-x} = \infty(0)$$

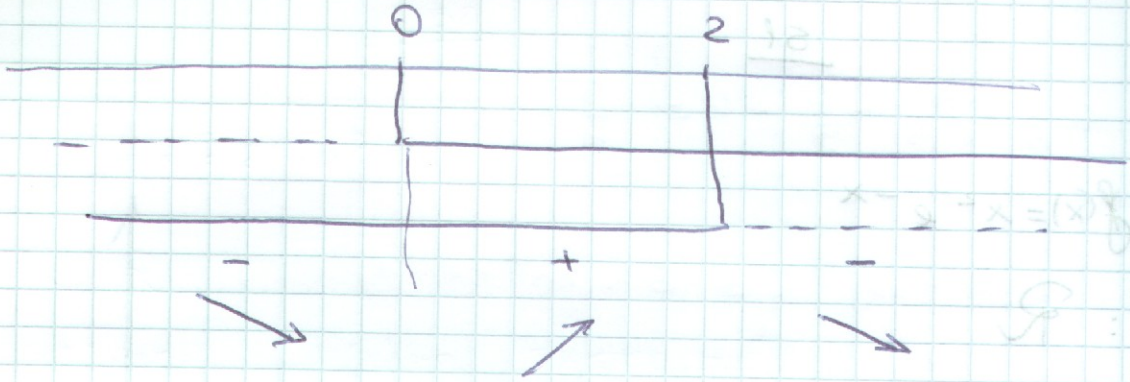
$$\lim_{x \to +\infty} \frac{x^2}{e^x} = 0$$

MAX E MIN

$$f'(x) = 2x e^{-x} - x^2 e^{-x} = e^{-x} x (2 - x)$$

$$f'(x) = 0 \qquad x = 0, \; x = 2$$

$$f'(x) > 0 \qquad \begin{cases} x > 0 \\ 2 - x > 0 \end{cases} \qquad \begin{cases} x > 0 \\ x < 2 \end{cases}$$



$x=0$ punto di min $\quad f(0)=0$

$x=2$ punto di max $\quad f(2)=4e^{-2}$

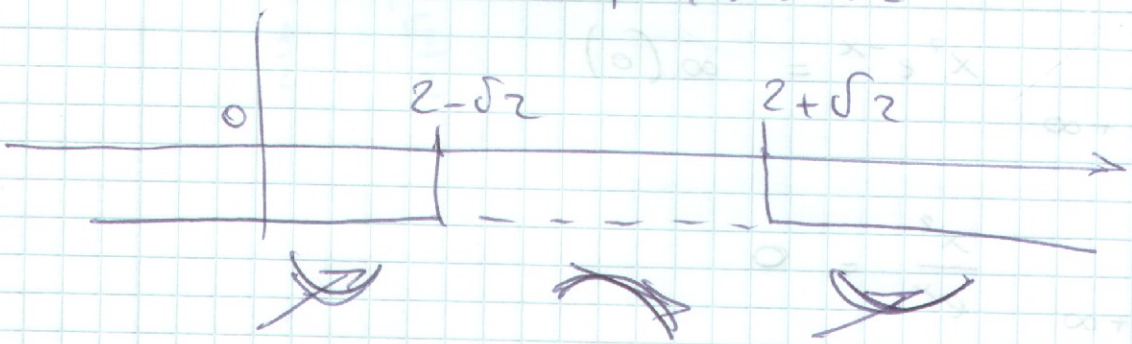
CONCAVITÀ E CONVESSITÀ

$$f''(x)=-e^{-x}(2x-x^2)+e^{-x}(2-2x)=$$

$$=e^{-x}(-2x+x^2+2-2x)=e^{-x}(x^2-4x+2)$$

$$x=2\pm\sqrt{2}$$

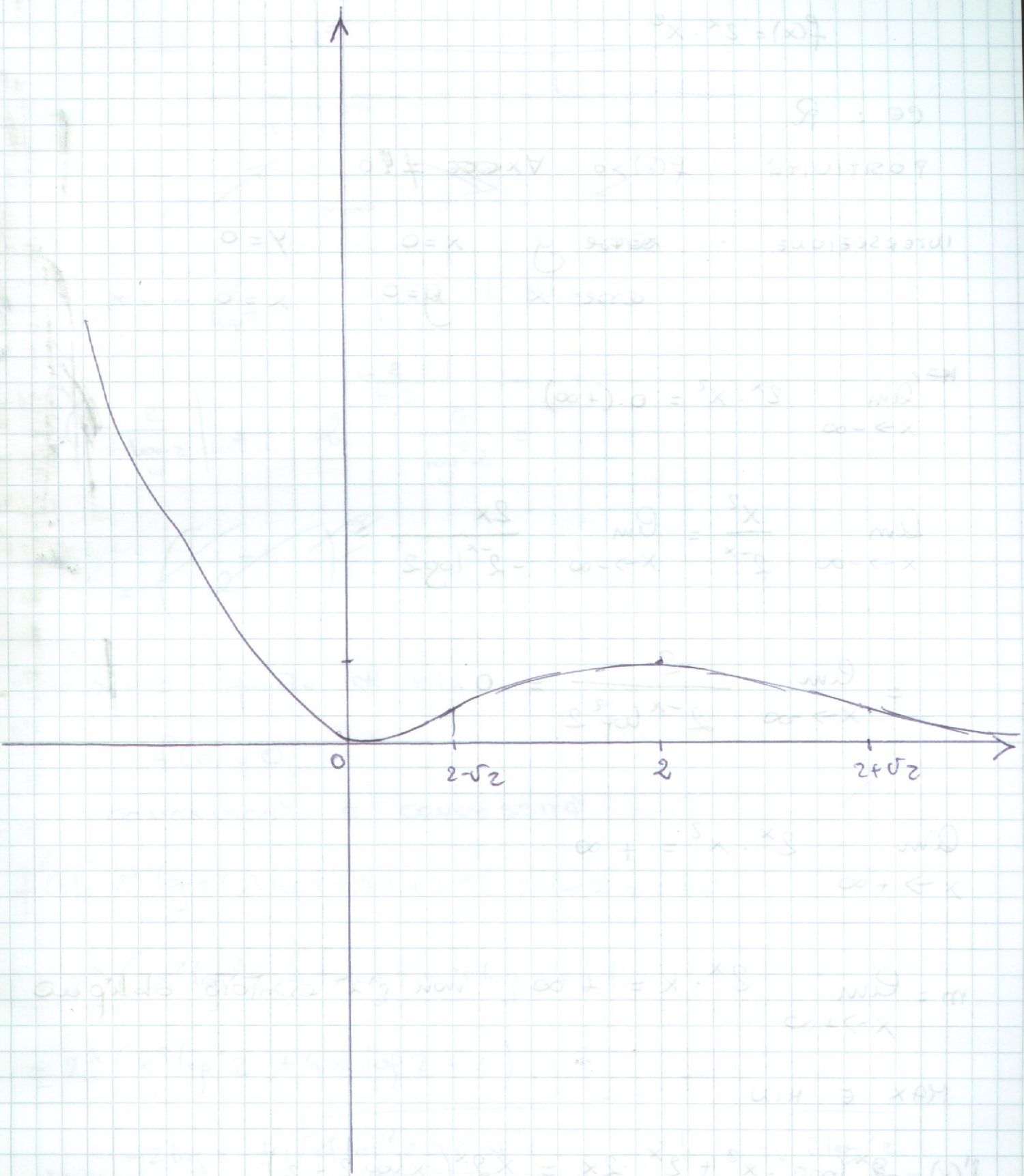
$f''(x)>0 \qquad x<2-\sqrt{2} \;;\; x>2+\sqrt{2}$



$x=2-\sqrt{2}$ punto di max

$$f(2-\sqrt{2})=(2-\sqrt{2})\,e^{-2+\sqrt{2}}$$

$x=2+\sqrt{2}$ punto di min


0
2-√2
2
2+√2