

## how to prove that $f^2+f'^2 \leq 1$ if ...

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Here is the following problem :

Prove that :  $f^2 + f'^2 \leq 1$  when  $f$  is twice differentiable over  $\mathbb{R}$  and :  $f^2 \leq 1$  and :  $f'^2 + f''^2 \leq 1$  (1 is greater than the sum of the square of the first and second derivative of  $f$ ).

I don't have the slightest idea on how to assert this, and this result (which happened to be an exercise in a french engineering school) may be false (but i found no counter-example) as it is false when replacing  $\mathbb{R}$  with any subset of  $\mathbb{R}$ .