Problem 3 (due on Monday, October 10)

a) Is there a function $f:\$ R\longrightarrow \mathbb R\s such that \[\frac{f(x)+f(y)}{2}\geq f\left(\frac{x+y}{2}\right)+ \sin^2(x-y)\] for all \$x,y\in \mathbb R\$?

[|] b) Is there a function \$f:\mathbb R\longrightarrow \mathbb R\$ such that \[| \frac{f(x)+f(y)}{2}\geq f\left(\frac{x+y}{2}\right)+ \sin|x-y|\] for all \$x,y\in \mathbb R\$?

The answer to a) is positive, for example $f(x)=4x^2$ has the property. The answer to b) is negative. We received only one solution, from Prof. Vladislaw Kargin, who solved a) and b) under additional assumption about f(essentially that f is continuous). For a detailed solution and some related material see the following link Solution.

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