THU-70250403, Convex Optimization (Fall 2021)	**Homework: 2**

Convex Functions

Lecturer: Li Li   `li-li@tsinghua.edu.cn`

Student:

Problem 1

Please prove $\sqrt{a^2 + b^2} + \sqrt{b^2 + c^2} + \sqrt{c^2 + a^2} \geq \sqrt{2}\,(a + b + c)$ for any $a, b, c \in \mathbb{R}$.

Problem 2

Please show that, for $\boldsymbol{x} > 0$, the function $f(\boldsymbol{x}) = \left(\sum_{i=1}^{n} x_i^p\right)^{\frac{1}{p}}$ is convex for $p > 1$ and is concave for $p < 1, p \neq 0$.

References