Notes of "Inequalities"

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Proposition 1. *If $x_1 \geq 0$, $x_2 \geq 0$, then the following inequality holds*

$$|\sqrt{x_1} - \sqrt{x_2}| \leq \sqrt{|x_1 - x_2|} \tag{1}$$

and the equality holds if and only if $x_1 = x_2$.

证明. □

Remark 1. *The geometric interpretation is related to the area of squares. Suppose x_1 and x_2 denote the area of two squares with one common vertex. Then the 平方 of the right side is the absolute difference of the area of the two squares, and the 平方 of the left side is the area of the square with the side length as the absolute difference of the side lengths of the squares. Then the inequality is clear.*

1 排序不等式

Wikipedia about rearrangement inequality

Example 1. *Prove that when $n > 1$ it holds that $n! < \left(\frac{n+2}{\sqrt{6}}\right)^n$*