

ROMANIAN MATHEMATICAL MAGAZINE

In $\triangle ABC$ the following relationship holds:

$$\sum_{cyc} a(\cos A - \cos B) \leq 0$$

Proposed by Nguyen Hung Cuong – Vietnam

Solution by Daniel Sitaru – Romania

$$\text{WLOG: } a \leq b \leq c \Rightarrow \cos A \geq \cos B \geq \cos C$$

By rearrangements' inequality:

$$a \cos A + b \cos B + c \cos C \leq a \cos B + b \cos C + c \cos A$$

$$a(\cos A - \cos B) + b(\cos B - \cos C) + c(\cos C - \cos A) \leq 0$$

$$\sum_{cyc} a(\cos A - \cos B) \leq 0$$

Equality holds for $a = b = c$.