In $\triangle ABC$ the following relationship holds:

$$\sum_{cyc} \frac{4m_b^2 - b^2}{4m_a^2 - a^2} = \sum_{cyc} \frac{tanA}{tanB}$$

Proposed by Ertan Yildirim-Turkiye

Solution by Daniel Sitaru-Romania

$$\sum_{cyc} \frac{4m_b^2 - b^2}{4m_a^2 - a^2} = \sum_{cyc} \frac{2(a^2 + c^2) - b^2 - b^2}{2(b^2 + c^2) - a^2 - a^2} =$$

$$= \sum_{cyc} \frac{a^2 + c^2 - b^2}{b^2 + c^2 - a^2} = \sum_{cyc} \frac{2accosB}{2bccosA} = \sum_{cyc} \frac{acosB}{bcosA} =$$

$$= \sum_{cyc} \frac{2RsinAcosB}{2RsinbcosA} = \sum_{cyc} \frac{\frac{sinA}{cosA}}{\frac{sinB}{cosB}} = \sum_{cyc} \frac{tanA}{tanB}$$