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In $\triangle ABC$ the following relationship holds:

$$\frac{m_a m_b}{r_c^2} + \frac{m_b m_c}{r_a^2} + \frac{m_c m_a}{r_b^2} \geq 3$$

Proposed by Nguyen Hung Cuong – Vietnam

Solution by Daniel Sitaru – Romania

$$\frac{m_a m_b}{r_c^2} + \frac{m_b m_c}{r_a^2} + \frac{m_c m_a}{r_b^2} \stackrel{AM-GM}{\geq} 3 \cdot \sqrt[3]{\left(\frac{m_a m_b m_c}{r_a r_b r_c}\right)^2} \geq 3 \cdot \sqrt[3]{\left(\frac{r_a r_b r_c}{r_a r_b r_c}\right)^2} = 3$$

Equality holds for $a = b = c$.