In ΔABC the following relationship holds:

$$\sum_{cyc} \left(\frac{cos^2\frac{A}{2} + 2sin^2\frac{A}{4}}{3} \right) > \frac{3}{4}$$

Proposed by Khaled Abd Imouti-Syria

Solution by Mirsadix Muzefferov-Azerbaijan

$$\frac{cos^2\frac{A}{2} + 2sin^2\frac{A}{4}}{3} = \frac{\frac{1+cosA}{2} + (1 - cos\frac{A}{2})}{3} = \frac{1 + cosA + 2 - 2cos\frac{A}{2}}{6} =$$

$$\frac{3 + cosA - 2cos\frac{A}{2}}{6} = \frac{3 + 2cos^2\frac{A}{2} - 1 - 2cos\frac{A}{2}}{6} = \frac{2 + 2cos^2\frac{A}{2} - 2cos\frac{A}{2}}{6} =$$

$$\frac{1 + cos^2\frac{A}{2} - cos\frac{A}{2} + \frac{1}{4} - \frac{1}{4}}{3} = \frac{\frac{3}{4} + (cos\frac{A}{2} - \frac{1}{2})^2}{3} > \frac{1}{4}$$