Original setting (before correction):

3882. *Proposed by Mehmet Sahin.*

Let ABC be a right angle triangle with $\angle CAB = 90^\circ$. Let $[AD]$ be an altitude and let I_1 and I_2 be the incenters of the triangles ABD and ADC, respectively. Let ρ be the radius of the circle through the points B, I_1 and I_2 and let r be the inradius of the triangle ABC. Prove that

$$\frac{\rho}{r} = \sqrt{2+\sqrt{2}}.$$

After correction:

3882. *Originally proposed by Mehmet Sahin; corrected version by Arkady Alt.*

Let ABC be a right angle triangle with $\angle CAB = 90^\circ$ and hypotenuse a. Let $[AD]$ be an altitude and let I_1 and I_2 be the incenters of the triangles ABD and ADC, respectively. Let ρ be the radius of the circle through the points B, I_1 and I_2 and let r be the inradius of the triangle ABC. Prove that

$$\rho = \sqrt{\frac{a^2+2ar+2r^2}{2}}$$

and $\min \dfrac{\rho}{r} = \sqrt{3}+\sqrt{6}$.