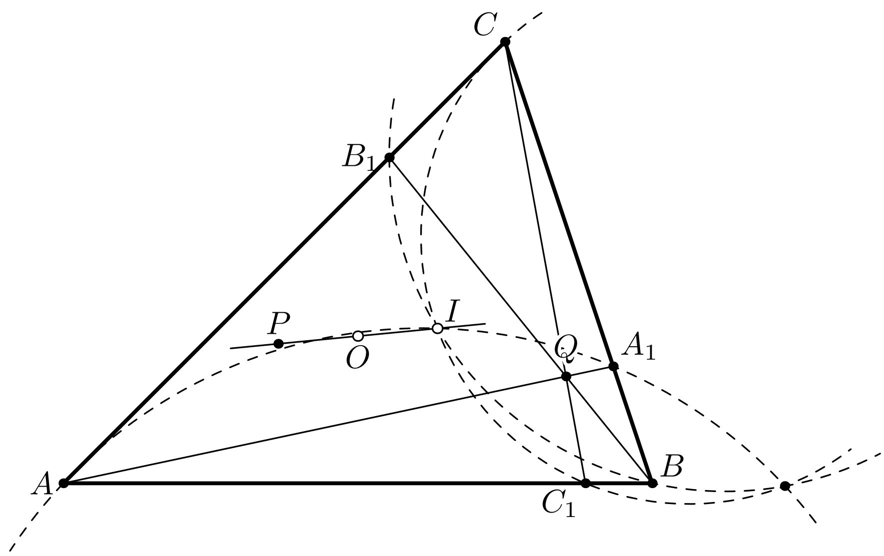
PROBLEM SECTION

In this section we suggest to solve and discuss problems provided by readers of the journal. The authors of the problems do not have purely geometric proofs. We hope that interesting proofs will be found by readers and will be published. Please send us solutions by email: `editor@jcgeometry.org`, as well as interesting "unsolved" problems for publishing in this Problems Section. All problems in this issue belong to Tran Quang Hung (`analgeomatica@gmail.com`).

Tran Quang Hung, **Coaxal circles generated by point on the Feuerbach hyperbola.**

Let ABC be a triangle with circumcenter O and incenter I. Let P be a point on the line OI and let Q be the isogonal conjugate point of P with respect to triangle ABC. It is known that the locus of points Q is the Feuerbach hyperbola. Let $A_1B_1C_1$ be the cevian triangle of the point Q with respect to the triangle ABC. Prove that circumcircles of triangles AIA_1, BIB_1, CIC_1 are coaxal.



Tran Quang Hung, **Two pairs of perspective triangles with the common circumcircle**

Here is the series of two problems. Let ABC and $A'B'C'$ be two triangles inscribed in the same circle ω and perspective from point P.

1. Let ω_a be the circumcircle of the triangle formed by the lines AB, AC and $B'C'$. Let A_1 be the second point of intersection of ω and ω_a. The points B_1, C_1, A_1', B_1' and C_1' we define analogously. Prove that the triangles $A_1B_1C_1$ and $A_1'B_1'C_1'$ are perspective.

2. Let ω_a be the circle which touches ω and segments AB and $B'A'$ as is shown on Fig. 2. Denote the touching point of ω_a and ω by A_1. The points B_1, C_1, A_1', B_1' and C_1' we define analogously. Prove that the triangles $A_1B_1C_1$ and $A_1'B_1'C_1'$ are perspective.

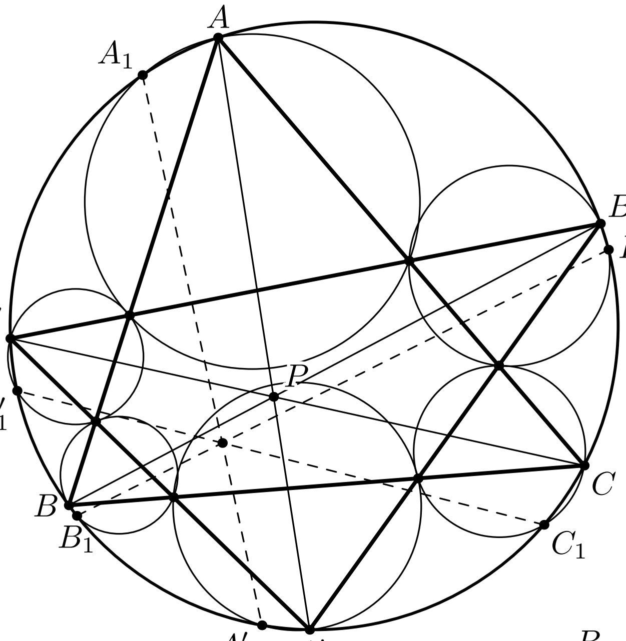


Fig. 1.

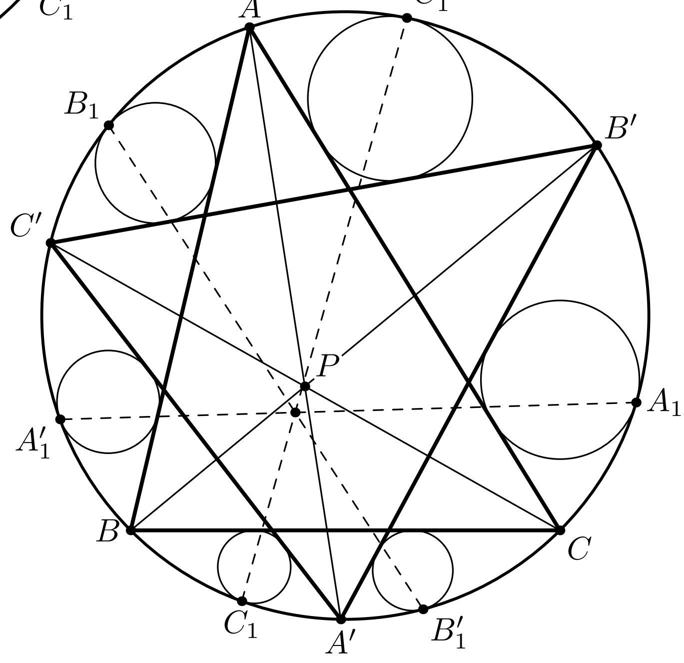


Fig. 2.