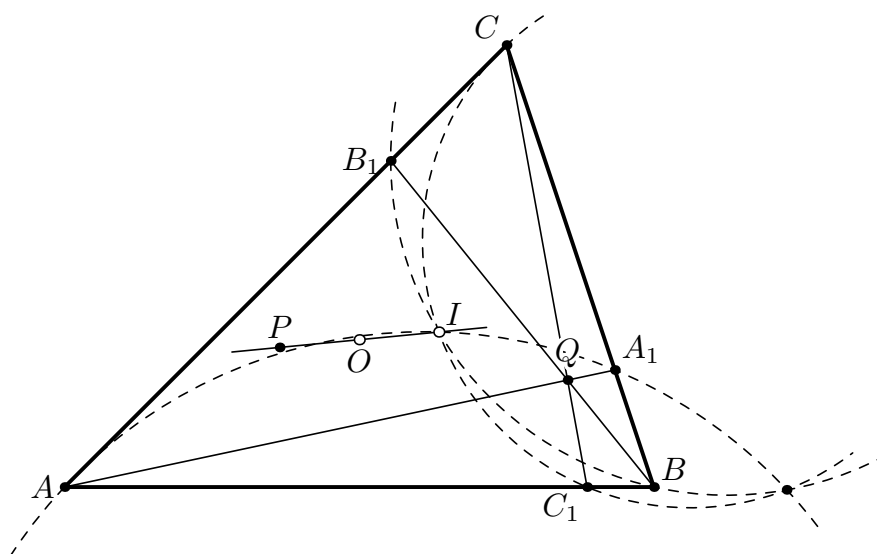


## PROBLEM SECTION

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](mailto: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](mailto:analgeomatica@gmail.com)).

*Tran Quang Hung*, **Coaxial 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 coaxial.



*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  $\omega$  and perspective from point  $P$ .

1. Let  $\omega_a$  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  $\omega$  and  $\omega_a$ . 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  $A'_1B'_1C'_1$  are perspective.

2. Let  $\omega_a$  be the circle which touches  $\omega$  and segments  $AB$  and  $B'A'$  as is shown on Fig. 2. Denote the touching point of  $\omega_a$  and  $\omega$  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  $A'_1B'_1C'_1$  are perspective.

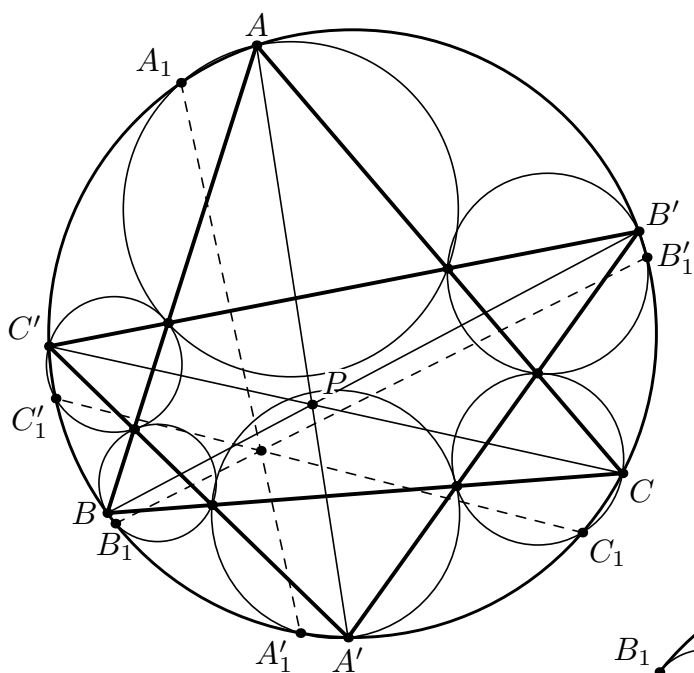


Fig. 1.

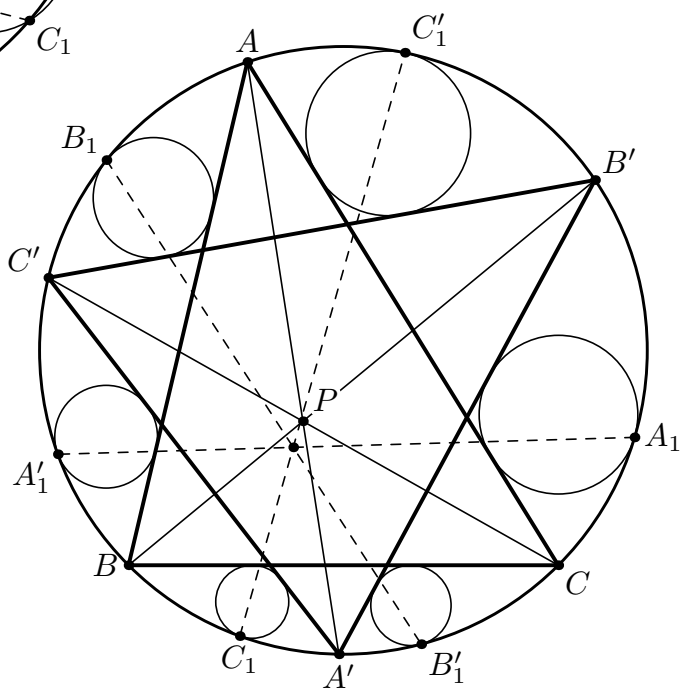


Fig. 2.