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Generalization of the Isoperimetric Point and the Equal Detour Point

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1. Introduction

Proofs of the following result are encouraged!

2. Results

Theorem 2.1. *Let $A, B,$ and C be the vertices of a given triangle.*
Let D be the circumcenter of ABC.
Let E be a point on line AD.
Let F be the point on line BD such that $BF : DF = AE : DE$.
Let G be the point on line CD such that $CG : DG = AE : DE$.
Let α be the hyperbola passing through G whose foci are A and B.
Let β be the hyperbola passing through F whose foci are A and C.
Let γ be the hyperbola passing through E whose foci are B and C.
Then $\alpha, \beta,$ and γ are concurrent at the two points H and I.

If we take $E = A$ then H becomes the isoperimetric point and I becomes the equal detour point.

References

[1] Weisstein, Eric W. "Isoperimetric Point." From MathWorld–A Wolfram Web Resource. https://mathworld.wolfram.com/IsoperimetricPoint.html

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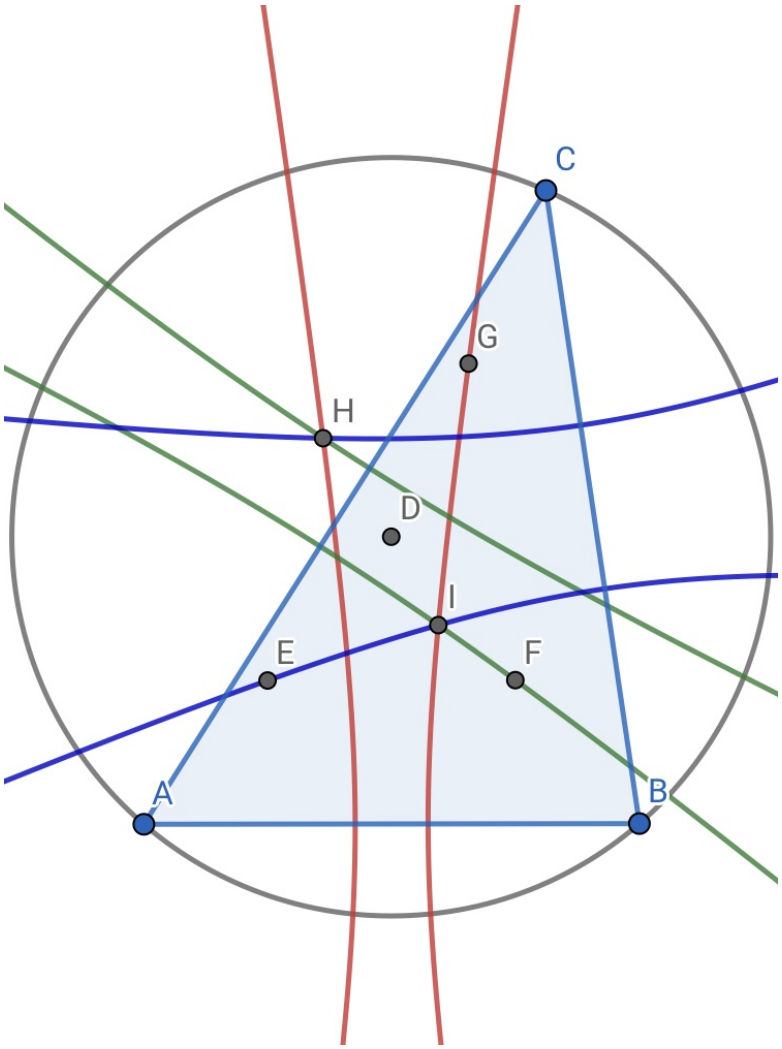

FIGURE 1. Illustration.