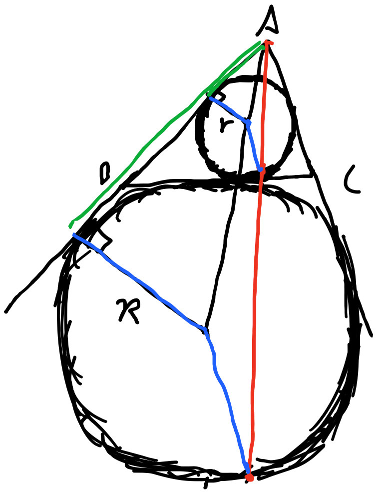
Enoch Yu

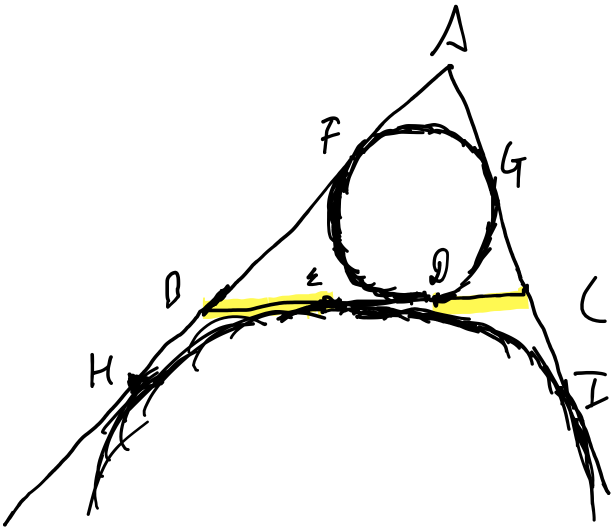
1. Let there be a triangle ABC. If I_1 and I_2 are incircle of ΔABC and ex-circle of ΔABC with respect to A, then, I_2 is the homothetic image of I_1 with the center A.



$\frac{r}{R}$

$\square$

2. Let ABC be a triangle where its incircle is tangent to side BC at point D. Define a point E on side BC such that $BE = CD$. Then the ex-circle of ΔABC from A is tangent to side BC at point E.



Let I_2 meet BC at E'.

- $CD = CG = EB$
- $E'C = CI$
- $HB = BE'$

$CE' = CI = AI - b = AH - b$
$= AB + BE' - b$
$= c - b + BE'$

$CE' = c - b + BE'$

$CE' - BE' = c - b = BD - CD = BD - BE$

$CE' + BE = BD + BE'$

$\cancel{BC} - BE' + BE = \cancel{BC} - CD + BE'$

$2BE = 2BE'$

$\therefore BE = BE'$ and $E \equiv E'$

Enoch Yu

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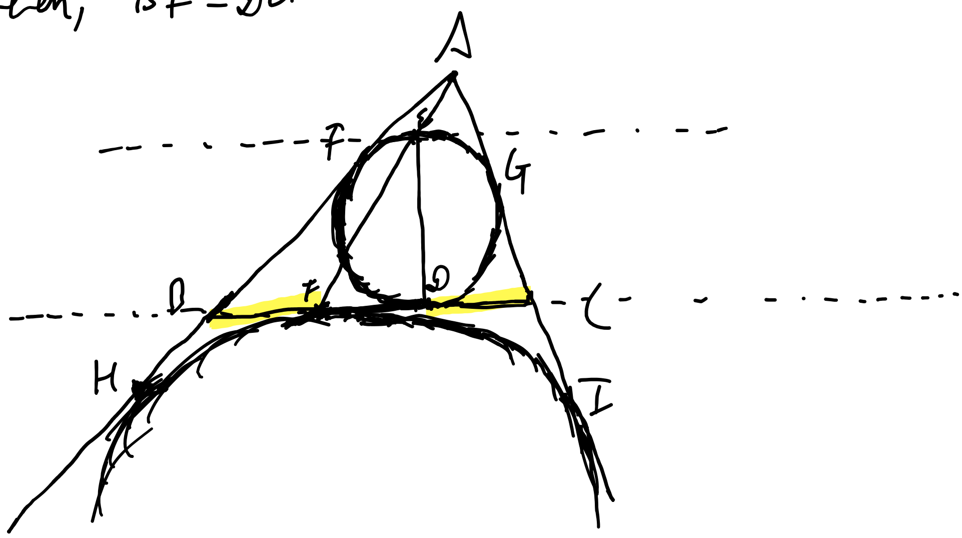
3. Let there be a triangle ABC where its incircle is tangent to BC at D. Let E be the point on the incircle such that DE is the diameter. If AE intersects BC at F, then, BF = DC.



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