Elementary triangle geometry

g

$z := x + i \cdot y$

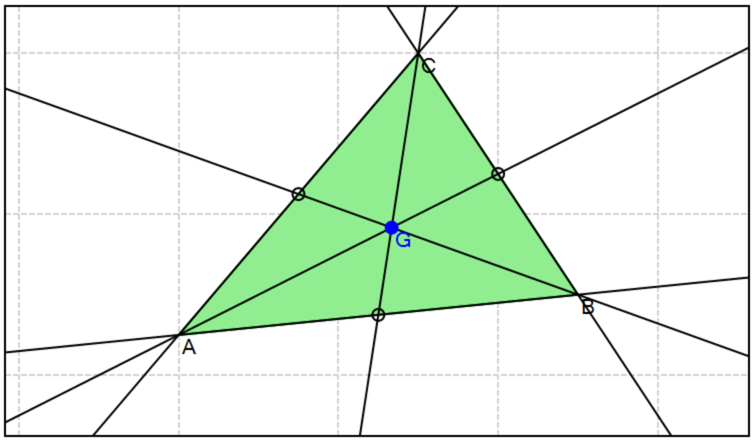
$$Points := \begin{cases} A := 2 + 2.5 \cdot i \\ B := 7 + 3 \cdot i \\ C := 5 + 6 \cdot i \end{cases} \quad Sides := \begin{cases} a := gL(B, C) \\ b := gL(A, C) \\ c := gL(A, B) \end{cases} \quad MP := \begin{cases} M_{AB} := 0.5 \cdot (A + B) \\ M_{BC} := 0.5 \cdot (B + C) \\ M_{AC} := 0.5 \cdot (A + C) \end{cases}$$

$$Tr := \begin{cases} [[\text{stack}(\text{"polygon"}, [z2xy(Points)], \text{"green"}, \text{"solid"}, 1, \text{"lightgreen"})]] \\ \text{eval}\left(\text{augment}\left(z2xy(Points), [\text{"A"} \ \text{"B"} \ \text{"C"}]^{T}, 8, \text{"black"}\right)\right) \end{cases}$$

Centroid and medians

$$ml := \begin{cases} m_a := gL(M_{AB}, C) \\ m_b := gL(M_{BC}, A) \\ m_c := gL(M_{AC}, B) \end{cases}$$

$G := \text{eval}(g\cap(m_a, m_b))$

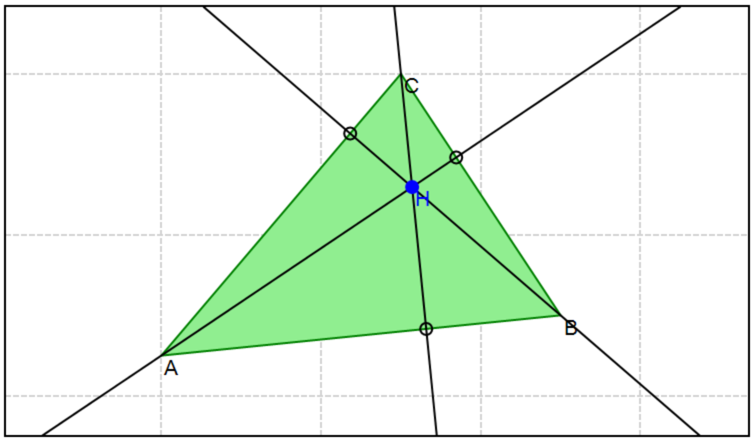


Orthocenter and altitudes

$$hl := \begin{cases} h_a := g\perp(a, A) \\ h_b := g\perp(b, B) \\ h_c := g\perp(c, C) \end{cases}$$

$H := \text{eval}(g\cap(h_a, h_b))$

$$HP := \begin{cases} H_a := \text{eval}(g\cap(a, h_a)) \\ H_b := \text{eval}(g\cap(b, h_b)) \\ H_c := \text{eval}(g\cap(c, h_c)) \end{cases}$$

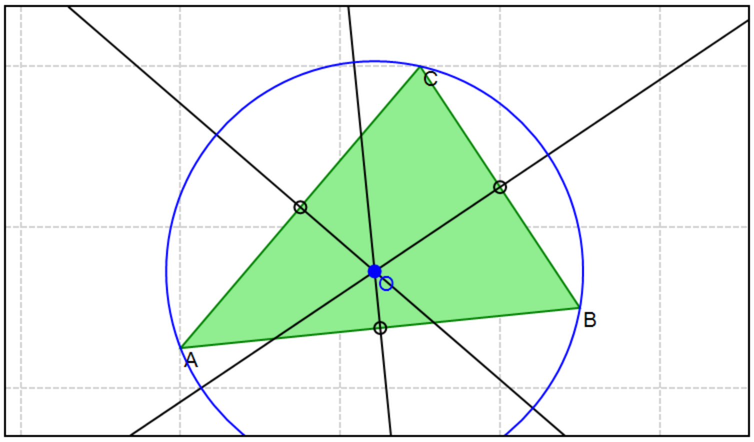


Circumcenter and perp. bisect.

$$\mu l := \begin{cases} \mu_a := g\perp(a, M_{BC}) \\ \mu_b := g\perp(b, M_{AC}) \\ \mu_c := g\perp(c, M_{AB}) \end{cases}$$

$O := \text{eval}(g\cap(\mu_a, \mu_b))$

$C_O := |O - z| - |O - A|$

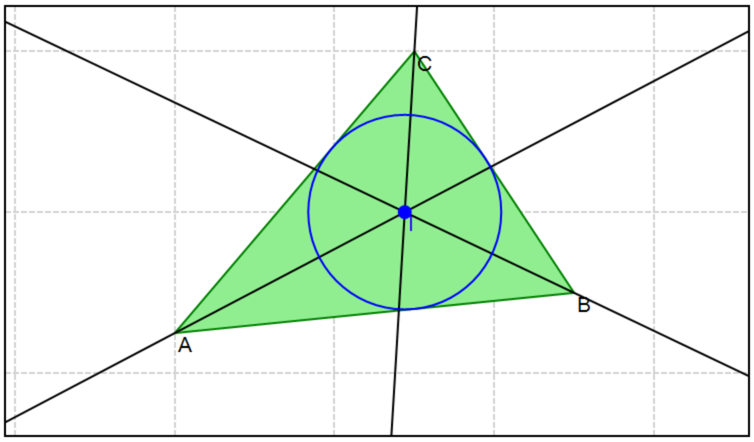


Incenter and andgle bisect.

$$\beta 1 := \begin{cases} \beta_A := g\beta(b, c) \\ \beta_B := g\beta(a, -c) \\ \beta_C := g\beta(a, b) \end{cases}$$

$$I := \mathrm{eval}\left(g\cap\left(\beta_A, \beta_B\right)\right)$$

$$C_I := \left|I - z\right| - \left|g\delta(a, I)\right|$$



Excenters and ext. angle biscet.

$$\beta' 1 := \begin{cases} \beta'_A := g\beta(b, -c) \\ \beta'_B := g\beta(a, c) \\ \beta'_C := g\beta(a, -b) \end{cases}$$

$$I_A := \mathrm{eval}\left(g\cap\left(\beta'_B, \beta'_C\right)\right)$$

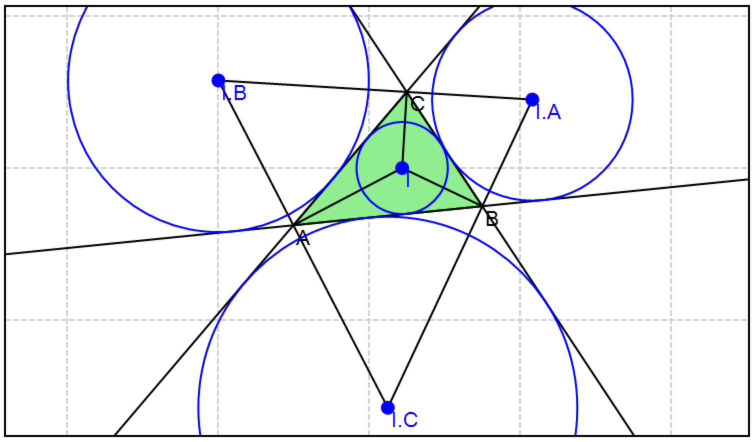
$$C_A := \left|I_A - z\right| - \left|g\delta(a, I_A)\right|$$

$$I_B := \mathrm{eval}\left(g\cap\left(\beta'_A, \beta'_C\right)\right)$$

$$C_B := \left|I_B - z\right| - \left|g\delta(b, I_B)\right|$$

$$I_C := \mathrm{eval}\left(g\cap\left(\beta'_A, \beta'_B\right)\right)$$

$$C_C := \left|I_C - z\right| - \left|g\delta(c, I_C)\right|$$

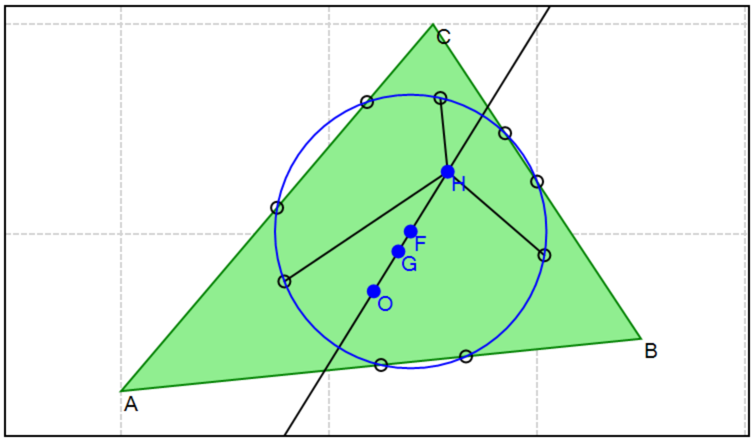


Euler Line & Feuerbach's circle

$$\varepsilon := gL(O, H)$$

$$MH := \begin{cases} M_{AH} := \mathrm{eval}\left(0.5\cdot(A + H)\right) \\ M_{BH} := \mathrm{eval}\left(0.5\cdot(B + H)\right) \\ M_{CH} := \mathrm{eval}\left(0.5\cdot(C + H)\right) \end{cases}$$

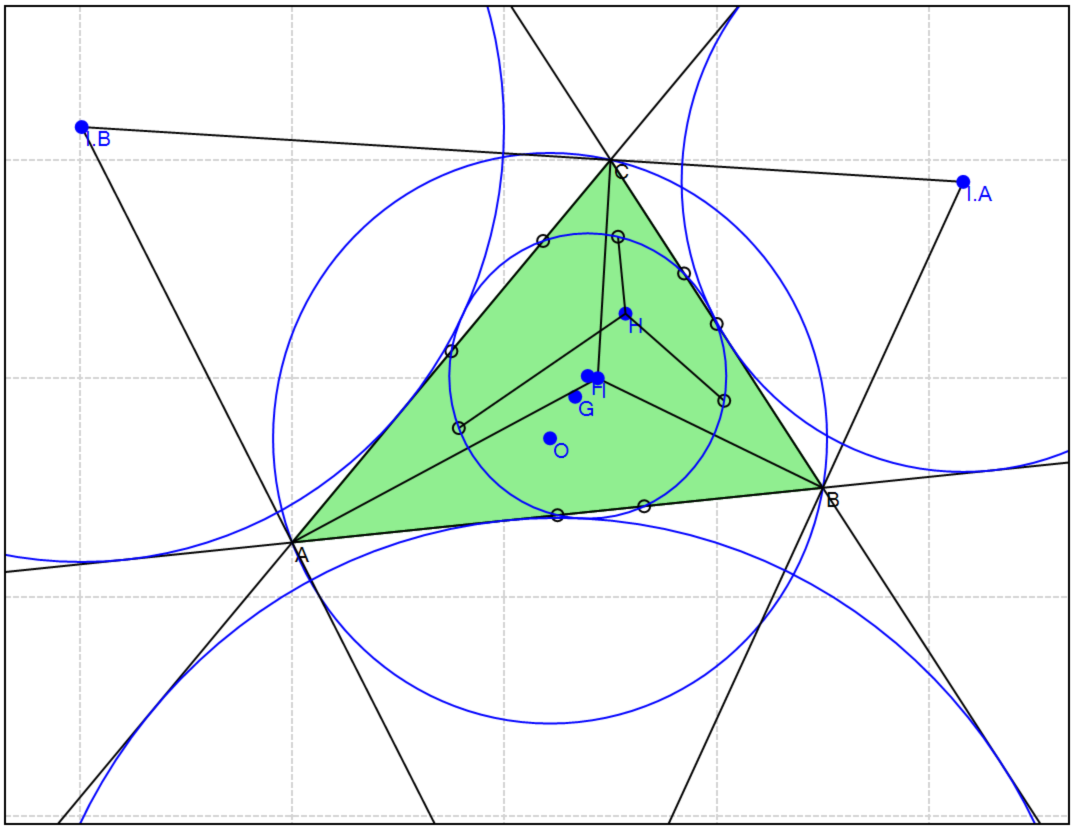
$$\left[\, F \;\; r_F \,\right] := \mathrm{eval}\left(gC\left(M_{AH}, M_{BH}, M_{CH}\right)\right)$$



⊟— Figure

⊞— Plot elements

- [x] Triangle
- [x] Sides
- [x] Mid Points
- [ ] Medians
- [x] Centroid
- [ ] Altitudes
- [x] Orthocenter
- [x] Altitudes foots
- [ ] Perp. Bisectors
- [x] Circumcenter
- [x] Incenter
- [x] Ext. A. Bisec.
- [ ] Euler Line
- [x] Feuerbach's C.



Alvaro

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