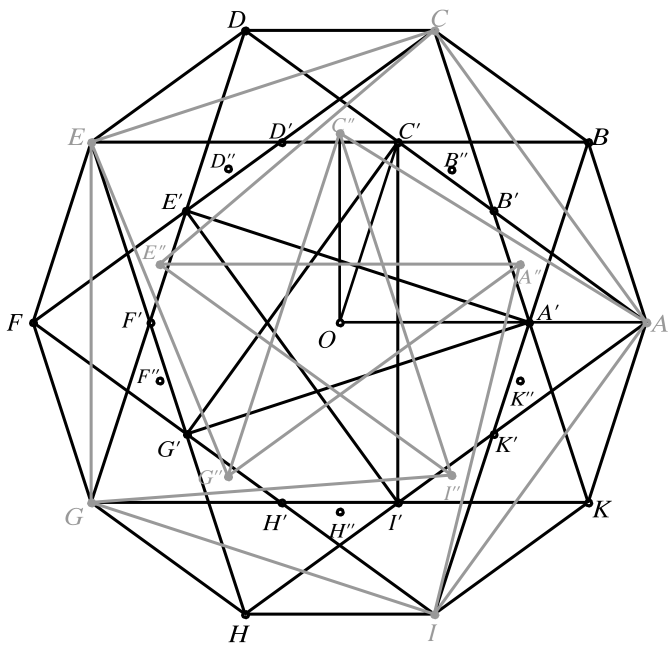
$$|A''E''| = |E''I''| = |I''C''| = |C''G''| = |G''A''| = s_5.$$

$$\angle AOC'' = \angle AOC' + \angle C'OC'' = 72^\circ + 18^\circ = 90^\circ,$$

$$|AC''|^2 = |OA|^2 + |OC''|^2 = r^2 + s_{10}^2 = s_5^2,$$

$$|AC''| = |CE''| = |EG''| = |GI''| = |IA''| = s_5.$$



Grey points and grey edges: Petersen graph as unit-distance graph if $s_5 = 1$.

On Note 104.09: **Martin Lukarevski writes:** In this Note we gave the inequality for the sum of the altitudes

$$4R + 10r \leqslant AI_A + BI_B + CI_C \leqslant 8R + 2r$$

and ended the Note with the conjecture: 'the lower bound $4R + 10r$ for $AI_A + BI_B + CI_C$ is sharp and cannot be strengthened by $5R + 8r$'. This is indeed true and for an example we look at very obtuse triangles which have very large circumradius. We take the triangle with sides $BC = 3$, $CA = AB = 1.51$. Then $R = 6.5711$, $r = 0.086458$ and we compute the altitudes of the excentral triangle $AI_A = 26.19752$, $BI_B = CI_C = 3.01499$. We have

$$AI_A + BI_B + CI_C = 32.2275 < 33.5471 = 5R + 8r,$$

showing that the lower bound $4R + 10r$ is optimal.

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