

Re: equilateral triangles

Source: <http://sci.tech--archive.net/Archive/sci.math/2005-12/msg00212.html>

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 - *Date:* 30 Nov 2005 21:14:12 -0800
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eugene wrote:

- > Let ABC be an equilateral triangle. Points A_1, B_1, C_1 are chosen inside the triangle in such a way that $A_1 \in BC_1, B_1 \in CA_1, C_1 \in AB_1$ and $AB_1 = B_1A_1, BC_1 = C_1B_1, CA_1 = C_1A_1$. Prove that the triangle $A_1B_1C_1$ is also equilateral.

One can look upon each side (AB,BC,CA) as a vector cube root of unity, $e^{i n 2 \pi/3}$ for $n = 0,1,2$. The vector addition is such that (AB_1, BC_1, CA_1) are formed by rotating each side by angle θ giving $m e^{i(n 2\pi/3 + \theta)}$ ($m < 1$) which can be verified by cross product to enclose an equilateral triangle for all θ . A vector argument concerning angles which gives a constant m is still needed here.

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