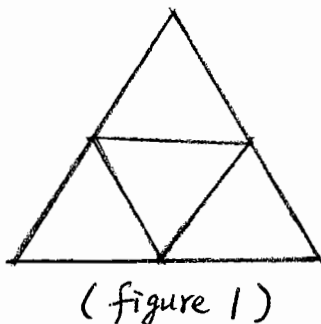


PROBLEM OF THE WEEK
Solution of Problem No. 8 (Spring 2007 Series)

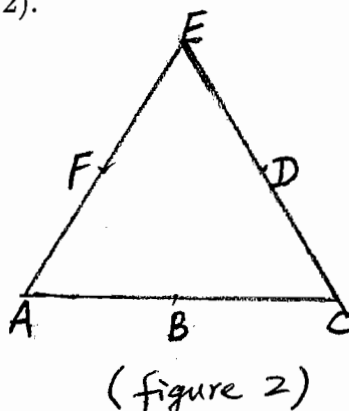
Problem: Show that, if a given equilateral triangle is in the union of five equilateral triangles of side 1, then it is contained in the union of four equilateral triangles of side 1.

Solution (by Steven Landy, IUPUI Physic)

We prove the equivalent contrapositive. If an equilateral triangle can't be covered by 4 side=1 equilateral triangles then it can't be covered by 5. This figure (figure 1) shows that 4 side=1 equilateral triangles can cover a side=2 equilateral triangle. So, if 4 equilateral triangles of side=1 can't cover an equilateral triangle, then the side of that triangle > 2 . Then the vertices and side midpoints $ABCDEF$ are pairwise more distant than 1. Thus each requires a distinct side=one equilateral triangle in a covering. So there must be ≥ 6 side=1 equilateral triangles in a covering (figure 2).



Also solved by:



Undergraduates: Siddharth Tekriwal (Fr. Engr.)

Others: Georges Ghosn (Quebec)