**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 \( \geq 6 \) side=1 equilateral triangles in a covering (figure 2).

![Figure 1](image1)

Also solved by:

**Undergraduates**: Siddharth Tekriwal (Fr. Engr.)

**Others**: Georges Ghosn (Quebec)