PROBLEM OF THE WEEK Solution of Problem No. 14 (Spring 2005 Series)

Problem: Show that there is no convex non–degenerate polyhedron with exactly 7 edges.

Solution (by Alan Bernstein, ECE, Purdue University; edited by the Panel)

A polyhedron must have at least 4 vertices. The only polyhedron with 4 vertices is the tetrahedron, which has only 6 edges. Therefore, the polyhedron in question must have at least 5 vertices.

A non–degenerate polyhedron must have at least 3 edges connected to each vertex. Each edge is connected to exactly 2 vertices, so the number of edges should be at least

 $(5 \text{ vertices } \cdot 3 \text{ edges/vertex})/2 = 7.5.$

Thus, a convex, non-degenerate polyhedron can not have 7 edges.

Also solved by:

<u>Graduates</u>: Miguel Hurtado (ECE)

<u>Others</u>: Georges Ghosn (Quebec), Steven Landy (IUPUI Physics staff), Sridharakusmar Narasimhan (Postsdam, NY), Daniel Vacaru (Pitesti, Romania)