

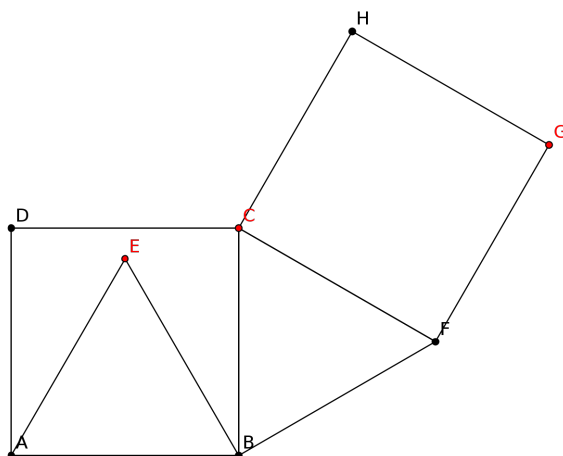
Problems of the Month

University of Louisiana at Lafayette

February, 2016

Solutions must be submitted by 03/15/2016. They can be emailed or handed in to Calvin Berry (cberry@louisiana.edu) or Leonel Robert (lrobert@louisiana.edu).

1. The squares and triangles in the figure all have sides of one unit of length. Show that the points E , C , and G are on a line and find the distance from E to G .



2. Find the largest number a such that $f(x) = \sin(x) - x + ax^3$ is an increasing function.
3. Show that $\sqrt{2} + \sqrt[3]{3}$ is an irrational number.

4. A plane cuts a paper cylinder at an angle of 45° with respect to the cylinder's axis. The intersection of the plane and the cylinder is the curve shown in red in the first figure. The cylinder is now cut along a line parallel to its axis and opened up on a flat plane. Show that the red curve becomes a whole period from a sine curve.

