1077-51-2565   **Niralee Shah*** (`niraleekshah@gmail.com`), 108 Brickyard Court, north Adams, MA 01247-3626, and **Luis Sordo Vieira**, **Ping Ngai Chung** and **Miguel Fernandez**. *Minimal Pentagonal Tilings.*

In 2001, Thomas Hales proved that regular hexagons provide a least-perimeter unit area tiling of the plane, better for example than squares and equilateral triangles, which are minimizing for polygons with three or four sides respectively, and no worse than a mixture of any other shapes. We seek the least-perimeter unit-area tiling of the plane by pentagons.

Work by Frank Morgan and students resulted in a proof that two other pentagons, called Cairo and Prismatic, yield least-perimeter unit-area tilings by convex pentagons. The original version of the paper asked whether there exist tilings by mixtures of these two pentagons. We have found uncountably many such mixtures and classified the doubly periodic ones by their wallpaper symmetry groups. We also consider tilings by mixtures of convex and nonconvex pentagons and perimeter-minimizing tilings on various flat tori. (Received September 22, 2011)

1