1077-51-1486 **Ping Ngai Chung*** (`briancpn@mit.edu`), 471 Memorial Drive, Cambridge, MA 02139, and **Niralee K. Shah**, **Luis A. Sordo Vieira** and **Miguel A. Fernandez**. *Tilings with nonconvex pentagons.* Preliminary report.

In 2001, Thomas C. Hales proved the Honeycomb Conjecture, which says that regular hexagons provide a least-perimeter unit-area way to tile the plane. Squares and equilateral triangles provide least-perimeter unit-area tilings by quadrilaterals and triangles. It is interesting to ask about a least-perimeter unit-area *pentagonal* tiling, since regular pentagons do not tile the plane. A recent paper by Frank Morgan and his students proves that among all *convex* unit-area pentagonal tilings of the plane and of appropriate flat tori, the Cairo and Prismatic pentagons minimize perimeter. They also conjecture that the convexity assumption is not necessary. We attempt to eliminate nonconvex pentagons by restricting the ratio of convex and nonconvex pentagons, and prove the result for some small flat tori. In the process we prove some bounds on the perimeter of certain classes of pentagons. (Received September 20, 2011)

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