1077-51-1580 **Miguel A. Fernandez*** (maf2831@truman.edu), **Ping Ngai Chung**, **Niralee K. Shah** and **Luis A. Sordo Vieira**. *Geometry of Surfaces with Density.*

Perelman's stunning proof of the million-dollar Poincaré conjecture needed to consider not only manifolds, but "manifolds with density" (like the density used in physics to compute the mass). We explore the basic geometry of such spaces by tackling one of the oldest problems in mathematics: the isoperimetric problem. That is, we seek curves that minimize weighted perimeter for a given weighted area. The classical (unit-density) isoperimetric theorem states that, for the plane, circles anywhere are isoperimetric. This usually changes when we introduce a non-unit density. The Log Convex Density Conjecture says that for radial, log-convex densities, circles about the origin are isoperimetric. We present our results so far regarding the borderline case of the plane with density e^r, and offer numerical evidence suggesting that circles about the origin are indeed isoperimetric. We conclude with possible ways to make our numerical study rigorous. (Received September 20, 2011)