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Alexander Diaz, **Nate Harman** and **Sean P Howe*** (seanpkh@gmail.com), 521 E 1st st., Moscow, ID 83843, and **David Thompson**. *Isoperimetric Regions in Planar Sectors with Density r^p* .

A manifold with density is a manifold with a positive function weighting both volume and perimeter. They have received increasing attention in recent years, most notably appearing in Perelman's proof of the Poincare conjecture. Building on the work of Dahlberg et al. in the plane, we consider the isoperimetric problem in planar sectors with radial density r^p , a problem of particular interest because of its relation to the L^p norm. We show that for $p \in (-\infty, 0)$ isoperimetric curves are circular arcs about the origin and for $p \in [-2, 0)$ isoperimetric curves do not exist. For $p > 0$, we show that for sectors of small angle circular arcs about the origin are isoperimetric, for sectors of large angle circular arcs through the origin are isoperimetric, and for a transition period in between isoperimetric curves are members of a family of unduloids. We provide bounds on the angles of the transition in terms of p and conjecture on the exact values. The conjecture is supported by theoretical results and numerical evidence. (Received July 27, 2009)