Tom Edgar (edgartj@plu.edu) and David Richeson* (richesod@dickinson.edu). Gregory’s theorem for inscribed and circumscribed regular polygons.

Archimedes famously used the perimeters of inscribed and circumscribed regular polygons to approximate the circumference of a circle and thus to obtain bounds for \( \pi \). In 1667, James Gregory did the same, but for areas. Let \( I_k \) and \( C_k \) denote the areas of inscribed and circumscribed regular \( k \)-gons, respectively. Gregory proved that for all \( n \), \( I_{2n} \) is the geometric mean of \( C_n \) and \( I_n \), and \( C_{2n} \) is the harmonic mean of \( C_n \) and \( I_{2n} \). In this talk we give a brief history of Gregory’s work and we present a short proof of his theorem. (Received September 25, 2018)