Logarithmic Spiral Patterns in Urban Growth Ruwaydah Sideek Mathematical Evolutions Andrew Platek and Jonathan Phillips Summer Ventures in Science and Mathematics The University of North Carolina at Charlotte

## Abstract

Logarithmic Spirals are the most elegant structures in Mathematics that embody the repeatable nature of the circle and continuous growth of the exponential functions. This paper tries to implement logarithmic spirals to model growth and expansion of cities. The maps of Sun City, Arizona and Raleigh, North Carolina have a logarithmic spiral traced through it to show how well they fit this model. I found an equation for the expansion of the city of Raleigh using this map. The phases of land growth in Raleigh are shown in another map to represent how much area each phase would have covered if its land did expand in the manner of a logarithmic spiral. The area enclosed by the spiral during each phase was found using the integral of the equation I found earlier to monitor the rate of expansion. While observing the logarithmic spiral traced over Sun City, Arizona, observations were made about the vertices of iterations of golden rectangles inscribed in concentric circles in the neighborhood.