The Puzzle with No Solution: An Analysis of the Konigsberg Bridge Problem Samuel K. Chao Mathematical Evolutions Ms. Jennifer McCarthy and Mr. Andrew Platek Summer Ventures in Science and Mathematics The University of North Carolina at Charlotte

Abstract

The Konigsberg Bridge Problem was originally just a simple walking game, but managed to evolve into an entirely new field of mathematics- graph theory. The objective of the problem was fairly basic: cross each of the seven bridges once and only once. Later, Euler took on the problem and introduced the basic multigraph, a fundamental construction of graph theory. He also proposed exactly three theorems of classifying graphs that were created by observing the nature of the degrees. These new methods eventually proved that it was impossible to cross each Konigsberg bridges a single time in one walk. The main portion of this paper will be devoted to explaining Euler's fundamental theorems and applying the same methods to analyze the layout of Magic Kingdom Park in Disney World, a real-life example of the Konigsberg Bridge Problem. These two layouts seemed to have similar properties in their multigraphs after much analysis of Euler's theorems. The connection of the Konigsberg Bridge Problem and Magic Kingdom Park will be made evident as I explain why these puzzles have no solutions.