Senior Thesis

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Characterizing Graphs with Equal Chromatic Symmetric Functions

Abstract

This thesis approaches the problem of characterizing graphs with equal chromatic symmetric functions. First, we explore the characteristics of the chromatic symmetric function of a general graph, and we show a novel way to decompose the chromatic symmetric function of a graph into a linear combination of chromatic symmetric functions of smaller graphs. Second, we narrow our focus to study the chromatic symmetric function of unicyclic graphs and give a method for constructing unicyclic graphs that share a chromatic symmetric function. Finally, we approach the problem of whether it is possible to determine a tree from its chromatic symmetric function. Working towards an answer to this question, we propose a method of classifying trees that illuminates the connection between the chromatic symmetric function and tree isomorphisms.