Chromatic Polynomials for 2-Edge-Colored Graphs

Steven Wu (wu.5622@buckeyemail.osu.edu)
Jeremy M Case (case.290@buckeyemail.osu.edu)
Ohio State University [Mentor:Sergei Chmutov]

Abstract of Report Talk: The chromatic polynomial is an important tool in the study of algebraic graph theory, initially introduced in 1912 by Birkhoff to study the four color problem, which counts the number of graph colorings as a function of the number of colors. In 2020, Beatona, Cox, Duffy, and Zolkavich introduced a generalization of the chromatic polynomial to 2-edge colored. We have obtained proofs for multiple facts about this polynomial including a modified method of deletion contraction and a generalization of Whitney's Broken Circuits Theorem that gives a combinatorial meaning to the coefficients of this polynomial. We also investigate the properties of the chromatic polynomial for 2-edge colored graphs and compare them to the ones of the polynomial for a traditional graph.