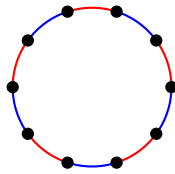


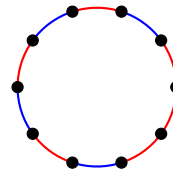
Graph Theory: Algebraically Defined Edge-Colored Graphs

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A proper edge-coloring of a graph G is an assignment of colors to the edges of the graph such that no two adjacent edges have the same color. The following graphs show one 10-cycle that is properly colored with 2 colors and one that is not. Classic questions of interest related to properly edge-colored graphs include the minimum number of colors needed to properly color a graph as well as the effect of edge coloring on properties of graphs.



Properly Colored



Not properly colored

In an algebraically defined bipartite graph, each vertex is assigned an (x, y) -coordinate pair and two vertices (x_1, y_1) and (x_2, y_2) are adjacent if a certain algebraic expression is satisfied. This project aims to study properties of edge-colored complete bipartite graphs obtained by assigning edge colors determined by various algebraic conditions. We will consider how different algebraic restrictions affect several graph properties.

Applicants should have completed a course in abstract algebra. Prior knowledge of topics in graph theory and some programming experience may be helpful, but are not necessary.