On k-Rainbow Colorings of Graphs

Alexis Byers, Western Michigan University

Let G be an edge-colored nontrivial connected graph, where adjacent edges may be colored the same. A path P in G is a rainbow path if no two edges of P are colored the same. Rainbow paths have been studied extensively. We present a closely related concept. For an integer $k \geq 2$, a path P in G is a k-rainbow path if every subpath of P having length k or less is a rainbow path. An edge coloring of G is a k-rainbow coloring if every pair of distinct vertices of G are connected by a k-rainbow path in G. The minimum number of colors required for a k-rainbow coloring of G is its k-rainbow connection number. We investigate k-rainbow colorings of several well-known classes of connected graphs and establish sharp upper bounds for the k-rainbow connection number of a graph in terms of the order of the graph. Other results on k-rainbow connection numbers are also presented. This is joint work with Zhenming Bi, Steve Devereaux and Ping Zhang.

Keywords: edge coloring, k-rainbow path, k-rainbow connection number