Abstract

Solving the problem of radio channel assignment leads to the vertex-labeling of graphs. In this thesis we study two ways of distance coloring such that each vertex is "colored" by a label from the set of positive integers. Let d be a positive integer. A d-distance labeling of a graph G is a labeling of $V(G)$ such that each pair of vertices distance at most d apart have different labels. The d-distance chromatic number of a graph G, $\chi_d(G)$, is the minimum number of colors (labels) for a d-distance labeling of the graph G. Let $K = \{k_i\}_{i=1}^{\infty}$ be a sequence of nonnegative integers. A $L(K)$-labeling of a graph G is a labeling of $V(G)$ such that each pair of vertices distance i apart have labels which differ at least by k_i. The $L(K)$-labeling number of a graph G, $\lambda_G(K)$, is the minimum span of colors for $L(K)$-labeling of the graph G.

We study these labelings on the infinite hexagonal lattice and give exact value of d-distance chromatic number. For this graph we then examine some boundaries for $L(K)$-labeling number and give exact value of $L(K)$-labeling number for the case that we have condition for distance at most 1 and at most 2 (for some pairs of k_1, k_2 there is just a conjecture given). Finally, the properties of $L(K)$-labeling number with condition for distance 2 of any graph G are discussed.