

Introduction to Game Closed Neighborhood Limited Chromatic Numbers

Luke Ross*, Saint John's University

Consider the following two person game on a graph G : Alice and Bob play a game where they color in vertices of a graph. On their turn, they can color in any uncolored vertex they choose so long as doing so would preserve a closed neighbor limited coloring. In a closed neighborhood limited coloring, for each vertex $v \in V(G)$, $N[v]$ contains at most one vertex colored i for each color class. At the beginning of the game Alice and Bob begin coloring with different colors. A new color can only be introduced into the game when it is necessary to maintain a closed neighbor limited coloring. Both players can use this shared color, but only if their original color cannot be played. The game ends when the graph is fully colored. One player is trying to maximize the number of colors needed and the other player is trying to minimize the number of colors needed. The game closed neighborhood limited chromatic number, denoted $\chi_{(N[v],g)}^+(G)$ is the minimum number of colors used when both players play optimally.

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