

Rainbow Connection Number Two and Clique Number

Arnfried Kemnitz*, Philipp Krause, Techn. Univ. Braunschweig, Germany;
Ingo Schiermeyer, Techn. Univ. Bergakademie Freiberg, Germany

An edge-colored connected graph G is called *rainbow connected* if each two vertices are connected by a path whose edges have different colors. Note that the edge coloring need not be proper. If such a coloring uses k colors then G is called *k -rainbow connected*. The rainbow connection number of G , denoted by $\text{rc}(G)$, is the minimum k such that G is k -rainbow connected.

Some obvious properties of the rainbow connection number of connected graphs G of order n and diameter $\text{diam}(G)$ are

1. $1 \leq \text{rc}(G) \leq n - 1$,
2. $\text{rc}(G) \geq \text{diam}(G)$,
3. $\text{rc}(G) = 1$ if and only if G is complete,
4. $\text{rc}(G) = n - 1$ if and only if G is a tree.

In general, it is not an easy task to determine the rainbow connection number of a given graph. In fact, it is already NP-complete to decide whether $\text{rc}(G) = 2$.

In this talk we determine all graphs G with rainbow connection number $\text{rc}(G) = 2$ and clique number $n - 4 \leq \omega(G) \leq n - 1$.

Keywords: edge coloring; rainbow connection; clique number