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Michael D. Barrus* (barrus@math.byu.edu), Department of Mathematics, Brigham Young University, Provo, UT 84602. *Uniqueness and minimal obstructions for tree depth.*

The tree depth of a graph G is the smallest natural number k for which there exists a coloring of the vertices of G with values from $\{1, \dots, k\}$ such that any path joining two vertices with the same color must contain a vertex having a color of higher value. The graph G is k -critical if it has tree depth k and every proper minor of G has smaller tree depth.

We define a graph G to be *1-unique* if for every vertex v in G , there exists an optimal ranking of G in which v is the unique vertex with label 1. We show that several classes of k -critical graphs are 1-unique, and we conjecture that the property holds for all k -critical graphs. Generalizing a previously known construction for trees, we exhibit an inductive construction that uses 1-unique k -critical graphs to generate large classes of critical graphs having a given tree depth. (Received September 12, 2013)