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The canonical coloring graph of trees and cycles

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Abstract

For a graph G and an ordering of the vertices π, the set of canonical k-colorings of G under π is the set of non-isomorphic proper k-colorings of G that are lexicographically least under π. The canonical coloring graph $Can^{\pi}{}_{k}(G)$ is the graph with vertex set the canonical colorings of G and two vertices are adjacent if the colorings differ in exactly one place. This is a natural variation of the color graph $C_k(G)$ where all colorings are considered. We show that every graph has a canonical coloring graph which is disconnected; that trees have canonical coloring graphs that are Hamiltonian; and cycles have canonical coloring graphs that are connected.

Keywords: Graph coloring, Canonical coloring

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Kanonični barvni graf dreves in ciklov

Povzetek

Za graf G in ureditev vozlišč π je množica kanoničnih k-barvanj grafa G glede na ureditev vozlišč π množica neizomorfnih pravih k-barvanj grafa G, ki so leksikografsko najmanjša glede na π. Kanonično pobarvan graf $Can^{\pi}_{k}(G)$ je graf, katerega množico točk predstavljajo kanonična barvanja grafa G, dve vozlišči pa sta sosednji natanko tedaj, ko se barvanji razlikujeta na natanko enem mestu. To je naravna variacija barvnega grafa $C_k(G)$, pri katerem so obravnavana vsa barvanja. Pokažemo, da ima vsak graf kanonično pobarvan graf, ki je nepovezan; da imajo drevesa kanonično pobarvane grafe, ki so Hamiltonovi; in da imajo cikli kanonično pobarvane grafe, ki so povezani.

Ključne besede: Barvanje grafov, kanonično barvanje.