

Prospects for the Hadwiger Conjecture

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Abstract

The two basic problems in chromatic graph theory related to the four color theorem for planar graphs are to eliminate reliance on a computer in its proof and to solve several open problems that generalize the theorem via vertex colorings, edge-colorings and the nowhere-zero flows. Among these unsolved problems is the Hadwiger conjecture from 1943 that the clique minor number is an upper bound to the chromatic number of a graph. This has been reduced to the four color theorem when the chromatic number is 4 or 5, but is open for larger chromatic numbers. Here, the Hadwiger conjecture will be discussed under the headings (a) the impact of "graph minors", (b) reduction to the four color theorem, (c) edge density and connectivity conditions forcing a large clique minor, (d) some families of graphs with arbitrarily large clique minors, and (e) the expected validity of the conjecture.