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Bounds on the fractional chromatic number of a graph.

Given a graph G and I , the family of independent sets in G , a function $f: I \rightarrow [0, \infty)$ is a fractional coloring if for each vertex v , the inequality $1 \leq \sum_{v \in I} f(I)$ holds. Further, the weight of f is $w(f) = \sum_{I \in I} f(I)$. The fractional chromatic number, $\chi_f(G)$, is

the minimum weight of all fractional colorings. We develop methods for producing upper bounds on χ_f . This leads to simple proofs for theorems similar to Grotzsch's 3-colorability theorem and the five color theorem for planar graphs.