

COMBINATORICS
SEMINAR

5-Coloring Graphs on Surfaces

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Abstract: Graph coloring is a much studied subfield of graph theory. Theorems concerning coloring graphs on topological surfaces, such as the Four Color Theorem or the Heawood Bound, are a useful avenue to understanding graph coloring in general. A deep theorem of Thomassen from the 1990's shows that for any surface there are only finitely many 6-critical graphs that embed on that surface. We discuss the history of this modern approach and its realisation for small surfaces. We also give a shorter self-contained proof of Thomassen's result by showing that for any 6-critical graph G that embeds on a surface of genus g , that the number of vertices is at most linear in g . Finally, we discuss generalizations to 5-list coloring, such as a recent solution to Albertson's conjecture that a planar graph with distant precolored vertices has a 5-list-coloring.

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