

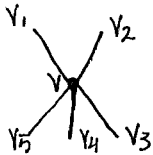
Attendance Quiz for Lecture 15

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1. Prove that every simple planar graph is 5-colorable.

Let G be a simple planar graph with a vertex v of degree ≤ 5 . Color $G' = G - v$. If degree of $v \leq 4$, pick any other color and color it that. If not, the graph is



There exists v_i, v_j where $1 \leq i < j \leq 5$ that are not connected by an edge. For example, v_1 and v_3 . Then contract v and v_1 , v and v_3 to form a new graph. Now color each vertex a different color. Reinstate the two edges, and color v_1 and v_3 what v was originally colored. Now color v any color that is not already on the graph. Thus G is 5-colorable since there was one color left for v .