Adapted list colouring of planar graphs

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Abstract

Given a (possibly improper) edge-colouring F of a graph G, a vertex colouring of G is *adapted to* F if no colour appears at the same time on an edge and on its two endpoints. If for some integer k, a graph G is such that given any list assignment L to the vertices of G, with $|L(v)| \geq k$ for all v, and any edge-colouring F of G, G admits a colouring c adapted to F where $c(v) \in L(v)$ for all v, then G is said to be *adaptably k-choosable*. In this note, we prove that K_5-minor-free graphs are adaptably 4-choosable, which implies that planar graphs are adaptably 4-colourable and answers a question of Hell and Zhu. We also prove that triangle-free planar graphs are adaptably 3-choosable and give negative results on planar graphs without 4-cycle, planar graphs without 5-cycle, and planar graphs without triangles at distance t, for any $t \geq 0$.

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