Notes

13 avril, 2015

8.4 list colorings, 9.1 4 color theorem

recall a list coloring is a proper coloring of G ($C : V(G) \to \mathbb{Z}$) where each vertex has a restricted list of possible colors

4 color thm

every planar graph is 4 colorable, ie G planar implies chromatic G less than 4 $\chi(G) \leq 4$

9.2 colorings of planar graphs

n friday we mentioned Haewood's counterexample to part of kempe's (erroneous) proof of the 4 color theorem.

haewood 5 color theorem

G planar implies $\chi(G) \leq 5$.

proof

in book, like half a page.

2 questions

what planar graphs have chromatic number less than 4?

1. disconnected points (trivial graphs)
2. bipartite (including trees)
3. when does this happen?

   partial answer: a maximal planar graph G of order 3 or more has chromatic number 3 if and only if G is Eulerian.

   you can remove edges without making coloring go up?

is every planar graph 4-choosable

thomassen thm

every planar graph is 5-choosable

are there planar graphs that are not 4-choosable? answer is yes.

thm

Mirzakhani graph is planar but not 4-choosable and has order 63 which betters the 238 order previous counter example.

homework: 3,4 due with 8.5