HOMEWORK 5 (MATH 180, WINTER 2021)

Read: **MN** (Second ed.), sections 6.1-4

Solve: Exercises in MN:

1, 3, 6 (not $*$) in §6.3

1, 4, 9 in §6.4

Additional exercises:

I. Suppose G is a connected planar graph such that the dual graph G^* has a Hamiltonian cycle. Prove that $\chi(G) \leq 4$.

II. Let $G = (V, E)$ be a plane triangulation. Prove that the edges of G can be colored with two colors so that between every two vertices there are monochromatic paths of both colors.

III. Let $G = (V, E)$ be a planar graph such that all faces are even-sided (have even number of edges). Prove or disprove: the edges of G can be 2-colored so that every face has an equal number of edges of each color.

$\star\star\star\star\star\star\star\star\star\star\star\star\star$

This Homework is due Wednesday Feb 17, at 8:59 am (right before class). Please read the collaboration policy on the course web page. Make sure you write your name in the beginning and your collaborators' names at the end. Box all answers. Remember that answers are not enough, you also need to provide an explanation exhibiting your logic. The explanation can be brief, but must indicate all logical steps.

P.S. Each item above has the same weight.