

Assignment 7

Post Date: 12 June 2017 **Due Date:** 19 June 2017 **Tutorial:** 21 June 2017

Problem 1: Planar Not-All-Equal SAT

4 Points

Give a transformation of instances of the general planar not-all-equal SAT problem into instances of planar not-all-equal 3-SAT, such that the algorithm from the lecture can be applied. Prove that the transformation is valid.

Hint: Recursively split pairs of literals from clauses with more than three literals by introducing a dummy literal in both parts.

Problem 2: Combinatorial Dual

6 Points

For the graphs

- (a) $G = K_5$ and
- (b) $G = K_{3,3}$, respectively,

show directly that there is no graph G^* such that there is a one-to-one correspondence between the edges of G and the edges of G^* with the property that

- the simple cycles of G correspond to the minimal cuts of G^* , and
- the minimal cuts of G correspond to the simple cycles of G^* .

Hint: Estimate the number of edges in G^* and deduce a contradiction from that.