

## Assignment 5

**Post Date:** 29 May 2017   **Due Date:** 6 June 2017, 12 pm   **Tutorial:** 7 June 2017

### Problem 1: Constructing the Dual

**6 Points**

Show how to construct the geometric dual of a plane graph in linear time.

You are given the cyclic order of the adjacent edges for each vertex. For full points, provide the pseudo-code with a description and a reasoning, why the code runs in linear time.

**Hint:** A useful data structure for handling walks around the faces of planar graphs is to have each edge represented by two directed edges in opposite directions.

### Problem 2: Selfdual

**4 Points**

A plane graph  $G$  is *selfdual* if  $G$  is isomorph to its geometric dual  $G^*$ .

- (a) Show that a selfdual graph with  $n$  vertices has  $2n - 2$  edges.
- (b) Construct for each  $n \geq 4$  a selfdual graph  $G_n$  with  $n$  vertices.