

## Homework 6.

*Submission deadline:* Wednesday, November 21.

**1** Let  $G$  be a 3-connected planar graph, and let  $(C_i : i \in V)$  and  $(D_j : j \in V^*)$  be a double cap representation of  $G$  on the sphere. Prove that the caps  $C_i$  and  $D_j$  cover the whole sphere.

**2** Can every simple planar graph be represented as the tangency graph of *congruent* circles? Try to formulate several necessary conditions.

**3** Prove that if two circles are orthogonal, then their images under any inversion are also orthogonal.