Math 9023 Homework 1

Due Thursday, 1/29/15

1. Let $D(K)$ be a connected link diagram in S^2

a) Prove that the regions of $S^2 \setminus D(K)$ can be checkerboard colored.

b) Prove that one may change some of the crossings of D so that the resulting diagram becomes alternating.

2. Work out the polyhedral decomposition for standard diagram of the 6_3 knot (see Figure 2.11(c) in Purcell's notes).

a) Check that the 1–skeleton of the polyhedra is indeed identical to the knot diagram.

b) Use the labeling of edges to verify that the gluing map on the faces is by a single "gear shift," with faces of one color rotated clockwise and faces of the other color rotated counterclockwise.

3. Do Exercise 2.7 in Purcell's notes.