

MATH 495: KNOT THEORY, HOMEWORK 6

SURFACES

Due in class, Thursday, 3/27

Problems (to turn in).

- (1) Prove that any subdivision of a single triangle has an Euler Characteristic of one.
- (2) Prove or find a counter example to each of the following statements. You may use the classifications theorems from class in your proofs.
 - (a) The Euler Characteristic is a perfect invariant of connected polyhedral surfaces with boundary.
 - (b) The Euler Characteristic is a perfect invariant of closed connected orientable surfaces.
- (3) Prove that the genus of a connected polyhedral surface with boundary is nonnegative. (Hint: Use the classification theorem and induct on the number of bands)
- (4) Given an orientable polyhedral surface of genus g with n boundary components (where $n \geq 1$), find a representation of such a surface as a disk with bands attached. Justify that the representation you give has genus g and n boundary components.