MAT8021, Algebraic Topology

Assignment 4

Due in-class on Friday, March 17

Numbered exercises are from Lee's "Introduction to topological manifolds," second edition.

1. Problem 6-1.

2. Problem 6-2.

3. Problem 6-3.

4. Problem 6-4.

5. Problem 6-5.

6. Show graphically that the simplicial complex with 7 vertices, generated by the triangles below, gives rise to a space homeomorphic to the torus.

$$123 \quad 127 \quad 134 \quad 145 \quad 156 \quad 167 \quad 236$$

$$245 \quad 246 \quad 257 \quad 347 \quad 356 \quad 357 \quad 467$$

7. For a 2-dimensional simplicial complex with v vertices, e edges, and f triangles, the Eulercharacteristic is defined to be $v - e + f$. If this simplicial complex gives rise to a compact surface, give formulas for e and f which are nondecreasing in v in terms of χ and v.

8. Using the formulas from the previous problem, show that any triangulation of a compact surface of Euler characteristic 0 requires at least 7 vertices, and any of Euler characteristic 1 requires at least 6 vertices.

9. Problem 6-6.