

**Math 4990 Problem Set 1**

DUE TUESDAY, SEP 15, 2015 IN CLASS

## INSTRUCTIONS

Write your solutions neatly and clearly, with complete justification (*i.e.*, proof). Please don't submit scratchwork. Consider using L<sup>A</sup>T<sub>E</sub>X. Draw figures (possibly by hand) whenever suitable.

Collaboration is encouraged, as long as you

- (1) understand your solutions,
- (2) write your solutions in your own words without copying, and
- (3) **indicate the names of your collaborators.**

Unless otherwise specified, all numberings refer to the textbook [DO].

## ASSIGNMENT

Liberally peruse **pages 1–10** of [DO].

In the sketch of Theorem 1.1, “a ray through a vertex is not counted as crossing  $\partial P$ ” is incorrect. Recall that we discussed this in detail during class. **Fix this error** and then flesh out the details. That is, do **Exercise 1.2**.

Do **Exercise 1.5** and **Exercise 1.14** about polygons with holes.

Read the relevant parts in Section 1.1 and do **Exercise 1.6** and **Exercise 1.7**.

Read (and understand) Corollary 1.9 (and the definitions of *ear* and *tip* above, the proof below). Do **Exercise 1.10**. It may be helpful to prove the following stronger statement: “Every polygon with more than three vertices has at least two ears *with non-adjacent tips*.”

Make sure you know how to do Exercises 1.11 and 1.12 (no need to turn in), and then do **Exercise 1.13** about mouths.

Do **Exercise 1.17** regarding uniqueness of triangulations.

Optionally, for no credit, do **Exercise 1.15**.