Homework 6

Math 282 Computational Geometry
Spring 2019

Solve the following problems from the textbook, and submit your solutions either on Moodle or in the homework mailbox (RMS level 3, near the fireplace) by 4:00pm on **Friday, March 22**.

If you are taking this course for elective credit towards the computer science major, then do the problem labeled CS only and not the problems labeled math only.

1. Exercise 3.19

2. math only: Exercise 3.20

3. CS only: Flipping an edge in a triangulation requires that the two triangles sharing that edge form a convex quadrilateral. Implement (in your favorite programming language) a function that takes in four points in counterclockwise order, a, b, c, d, and returns *true* if the quadrilateral is convex (and so either the edge ac or bd or flippable), and *false* if it is nonconvex.

For this problem, hand in your code and also a demonstration showing that your code works correctly for both convex and nonconvex quadrilaterals. For example, this could be a screenshot or text copied from your terminal showing what happens when you run your program.

4. Exercise 3.21 (c)

5. Exercise 3.26 — Only point sets (a) and (c). We found the flip graph of (a) in class, and you found the flip graph of (c) in the previous exercise.

6. Exercise 3.52

7. For any point set, and any triangulation of that point set, one may add up all edge lengths in the triangulation. Prove or disprove that this sum is always minimized by the Delaunay triangulation. Any examples you use should be different from those in the text.