COMPUTATIONAL GEOMETRY
Homework Set # 5

Due at the beginning of class on Wednesday, April 9, 2008.

Recommended Reading: O'Rourke, Chapter 4 (especially sections 4.1, 4.2, 4.4, 4.6) and Chapter 5, sections 5.1–5.3.

In all of the exercises, be sure to give at least a brief explanation or justification for each claim that you make.

(1). [10 points] O'Rourke, problem 4, section 4.1.6, page 108.

(2). [21 points] (a). Is there a polyhedron with exactly 7 edges? Justify! (draw one, or argue that none exists)

(b). Is there a polyhedron with exactly 8 edges? Justify! (draw one, or argue that none exists)

(c). Is there a polyhedron with exactly 9 edges? Justify! (draw one, or argue that none exists)

(3). [9 points] O'Rourke, problem 1, section 4.4.4, page 149.

(4). [20 points] Describe in words and draw figures for the Voronoi diagram (in blue) and Delaunay diagram (in red) for each of the following sets of points.

(a). O'Rourke, problem 1, section 5.3.3, page 164. (Reminder: A *regular* n-gon is a very special convex n-gon in which all the edges have the same length.)

(b). 5 points all lying on a common circle (at arbitrary positions on the circle), *plus* a point at the center of the circle

(c). 8 points all lying on a common line (at arbitrary positions on the line)

(5). [20 points] O'Rourke, problem 6, section 5.3.3, page 165.

(6). [20 points] Let S be the set of points {(-1,-2), (2,2), (5,6), (8,6), (9,2), (12,2), (12,-2), (8,-2), (5,-2)}. Construct and draw the Delaunay diagram (in red) and the Voronoi diagram (in blue). (We assume the usual Euclidean metric.)

(If you use software to assist you or to verify your diagram, please provide the url (web address) of the code you used.)