CS 506, HW1

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Due: Feb. 16th

You are encouraged to work on the homework in groups of about 2 or 3. You may turn in one writeup per group, but please certify that all members worked on each problem. Note that David Mount's notes and homework problems are available in the link off the course web page.

1. Exercise 8.1 from the textbook

2. Exercise 8.2 from the textbook

3. Exercise 8.7 from textbook.

4. Exercise 9.16 from textbook

5. Exercise 8.10 from textbook

6. In the online convex hull problem, we are given a set of n points one at a time. After receiving each point, we compute the convex hull of all points seen so far. Consider this problem in the 2D plane. Give an efficient online algorithm to update the convex hull when a new point is given. Analyze your algorithm.

7. Problem 2, HW 1 from David Mount's class (Pareto Optimal/Convex Hull problem)

8. Problem 4, HW 3 from David Mount's class (ϵ sketch of convex hull).

9. Challenge: (This is the type of problem that could turn into a project or potentially a paper) Can you adapt the ϵ-sketch convex hull problem to come up with a similar type of sketch of the upper envelope in an arrangement? What can you say formally about the number of lines in your sketch of the upper envelope and how well the sketch approximates the true upper envelope? (Super Challenge: Any connections to sketching a Voronoi diagram?)