Homework 3

Math 282 Computational Geometry
due 5:00pm on Tuesday, March 9

Solve the following problems from the textbook, and write your solutions clearly and neatly. Make sure to explain your reasoning and provide mathematical details that support your answers. For a few tips on writing solutions, see this helpful guide for mathematical writing.

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**.

You may write or type your solutions electronically, or write them on paper and scan/photograph them. If you photograph your papers, please use a scanning app to produce a single PDF file containing your solutions. Upload your written solutions (and your code/output if you do the CS only problem) to the Homework 3 assignment on Moodle.

1. **all:** Exercise 1.52
2. **all:** Exercise 2.1 — Note that $\text{conv}(S)$ is defined in terms of intersections. Show that if a and b are points in $\text{conv}(S)$, then the line segment with endpoints a and b is also in $\text{conv}(S)$.
3. **all:** Exercise 2.4
4. **math only:** Exercise 2.5
5. **CS only:** Recall the naïve convex hull algorithm from class on March 2: For each pair of points a and b, if every other point c is left of the segment ab, then ab is a hull edge. Implement this algorithm in your favorite programming language. You may assume that no three points are collinear (i.e., the points are in general position). You may output the hull edges in any order.

   For this problem, hand in your code *and also* sample output from your program to show that your code works.
6. **all:** Exercise 2.12 — Pseudocode suffices, but be sure to give enough detail to precisely describe your modifications to the algorithm.
7. **all:** Exercise 2.13 — Again, pseudocode suffices, but give enough detail to precisely describe your modifications to the algorithm.