

Homework 5

Math 282 Computational Geometry
due 5:00pm on Wednesday, January 18

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 problem 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 5](#) assignment on Moodle.

1. **all:** Exercise 3.2
2. **all:** Exercise 3.3
3. **all:** Exercise 3.11 — Say how you would modify the Graham scan algorithm so that it returns a triangulation instead of a convex hull.
4. **all:** Exercises 3.14 — Recall that the *degree* of a vertex v is the number of edges incident to v .
5. **all:** Exercise 3.18
6. **all:** Exercise 3.19
7. **math only:** Exercise 3.24
8. **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.
9. **all:** Exercise 3.29