CS 763 Fall 2022 due Wednesday November 2
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ASSIGNMENT 4

ACKNOWLEDGE YOUR SOURCES.

1. [5 marks] Please send your answer to this question as text in an email message, so I can easily and quickly approve or make suggestions.

   Decide on your course project. Details about the project are now on the course web page. Please specify:

   (a) which paper(s) you will present

   (b) why you chose this paper (just a line or two)

   Note: In case you wish to change your project topic later on, just send me a revised proposal and the reason or the change.

   I will ask you to choose a presentation date on Piazza.

2. [10 marks] The *farthest point Voronoi diagram* of point set $P = \{p_1, \ldots, p_n\}$, in the plane, is the locus of points equally far from more than one site of P. More precisely, define the farthest region for p_i to be $\{x \in R^2 : d(x, p_i) \geq d(x, p_j), \forall p_j \neq p_i\}$.

   (a) Prove that the farthest region for p_i is convex.

   (b) Characterize the sites with unbounded farthest regions.

   (c) Characterize the sites with empty regions.

3. [5 marks] Show how to compute the Gabriel graph from the Delaunay triangulation in linear time.

4. [10 marks] Give an $O(n \log n)$ time algorithm for the following problem. The input is a set S of n points in the plane and a natural number k. Partition S into a set of k disjoint subsets $S_1, S_2, \ldots, S_k$ that are "as far from each other as possible"—to be precise, you must maximize the minimum distance between two point from different subsets. Keep your algorithm high-level. You may use algorithms and results from class. Make sure you prove that your approach is correct.

   HINT: this whole assignment is about Voronoi diagrams and Delaunay triangulations.