1 Exercises from Lecture 1

In both exercises, you can assume that there are no three points on a line and no four points on a circle.

Exercise 1

Show that there exists a Delaunay triangulation for any set of points in $\mathbb{R}^2$.
(Hint 1) The answer is yes.
(Hint 2) Consider four points that form a convex quadrilateral. There are two choices for triangulation, and we can move from one to the other by flipping the diagonal edge in the quadrilateral. How can we get the triangulation that satisfies the empty circle condition?

Exercise 2

Let $p = (p_x, p_y), q = (q_x, q_y) \in \mathbb{R}^2$ be two points in a plane. The distance between them is defined as $d(p, q) = \sqrt{(p_x - q_x)^2 + (p_y - q_y)^2}$. Given a set of points $p_1, \ldots, p_n \in \mathbb{R}^2$, we make a triangulation by joining points p_i and p_j iff $V(p_i)$ and $V(p_j)$ share an edge in common where $V(p_i) = \{x \in \mathbb{R}^2 \mid d(x, p_i) \leq d(x, p_j),\ j = 1, \ldots, n\}$. Show that the resulting triangulation is a Delaunay triangulation.