Exercise T1 (Unique intersection point) (5 points)
Let $r < 1$, $C$ be a Jordan curve, $s^{(1)}, s^{(2)}$ be two neighboring $r$-sample points on $C$ and $p$ an intersection point of the bisector of the line segment $[s^{(1)}, s^{(2)}]$ and the curve arc between $s^{(1)}, s^{(2)}$. Show that the point $p$ is unique.

Exercise T2 (Angles between sample points) (5 points)
Show that for three neighboring sample points $s^{(1)}, s^{(2)}, s^{(3)}$ on a Jordan curve, the (smaller) angle between the segments $[s^{(1)}, s^{(2)}]$ and $[s^{(2)}, s^{(3)}]$ is at least $\pi - 2 \arcsin(r/2)$ for $r < 2$. In particular this angle is larger than $\frac{\pi}{2}$ for $r \leq \frac{1}{3}$.

Exercise T3 (NN-Crust) (5 points)

**Input:** finite sample $S \subset \mathbb{R}^2$

**Output:** a subset $G(S)$ of edges of the Delone subdivision of $S$

Compute the edge set $D$ of the Delone subdivision of $S$. Compute the edge set $N \subset D$ which connects nearest neighbors in $S$. $G \leftarrow N$

**foreach** sample point $x \in S$ that is contained in exactly one edge $e \in N$ **do**

- Determine the shortest edge $e' \in D$ containing $s$ that forms an angle greater than $\pi/2$ with $e$.
- $G \leftarrow G \cup \{e'\}$

**end**

**return** $G$

Consider the above **NN-Crust** algorithm with $m$ sample points. Provide an exact formulation of steps 2 to 5 which have in total a cost of at most $O(m)$. 