Problems: Computational Geometry

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September 11, 2023

1. *[CLRS]* Given a point $p_0 = (x_0, y_0)$, the right horizontal ray from p_0 is the set of points $\{p_i = (x_i, y_i) : x_i \geqslant x_0, y_i = y_0\}$. Determine whether a given right horizontal ray from p_0 intersects a line segment p_1p_2 in $O(1)$ time.
2. How will you check if a point is inside or outside a given x-monotone polygon?
3. *[CLRS]* Give an $O(nlogn)$ time algorithm to determine whether two simple polygons with a total of n vertices intersect.
4. *[CLRS]* A disk consists of a circle and its interior and is represented by its centre point and radius. Two disks intersect if they have any point in common. Give an $O(nlogn)$ time algorithm to determine whether any two disks in a set of n disks intersect.