Problem 3.1 [Right Isosceles Triangle Range Searching].

Describe and analyze a static data structure for storing a set of $n$ 2D points subject to the following query operation:

Given an axis-aligned right isosceles triangle (bounded by a horizontal, vertical, and diagonal line), report the $k$ points in the triangle in $O(\log n + k)$ time.

Your data structure should occupy $O(n \text{ polylog } n)$ space.

Figure 1: An example range query by an axis-aligned right isosceles triangle.