

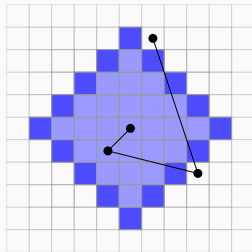
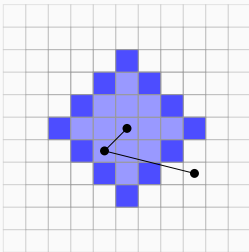
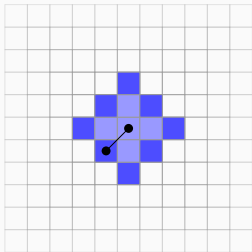
D: Delicious Disaster

Problem author: Jannik Olbrich, Paul Wild

Problem

Find the size of an ever expanding pile of magic porridge in an infinite grid.

- The porridge occupies all cells (x, y) such that $|x| + |y| \leq r$.
- You can query locations (x, y) to check if they are inside or not.
- The size r increases by 1 for each query you ask.
- Successive queries can be at most 1000 steps apart.
- Initial size: $r_0 \leq 10^6$, maximal number of queries: 5000.



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Solution

- The bound on successive queries makes binary search impossible.
- Instead, start by moving away from the origin by steps of 1000.
- This way, it takes at most ~ 1000 queries to reach an outside cell.
- You could now use binary search, while carefully handling the growing of the porridge.
- Instead, keep querying the same location until the porridge catches up to you.
- This takes another ~ 1000 queries.