Problem 3464: Maximize the Distance Between Points on a Square

Problem Information

Difficulty: Hard
Acceptance Rate: 21.74%
Paid Only: No
Tags: Array, Binary Search, Greedy

Problem Description

You are given an integer `side`, representing the edge length of a square with corners at `(0, 0)`, `(0, side)`, `(side, 0)`, and `(side, side)` on a Cartesian plane.

You are also given a **positive** integer `k` and a 2D integer array `points`, where `points[i] = [xi, yi]` represents the coordinate of a point lying on the **boundary** of the square.

You need to select `k` elements among `points` such that the **minimum** Manhattan distance between any two points is **maximized**.

Return the **maximum** possible **minimum** Manhattan distance between the selected `k` points.

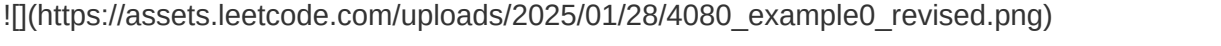
The Manhattan Distance between two cells `(xi, yi)` and `(xj, yj)` is `|xi - xj| + |yi - yj|`.

Example 1:

Input: side = 2, points = [[0,2],[2,0],[2,2],[0,0]], k = 4

Output: 2

Explanation:



Select all four points.

Example 2:

Input: side = 2, points = [[0,0],[1,2],[2,0],[2,2],[2,1]], k = 4

Output: 1

Explanation:

Select the points `(0, 0)`, `(2, 0)`, `(2, 2)`, and `(2, 1)`.

Example 3:

Input: side = 2, points = [[0,0],[0,1],[0,2],[1,2],[2,0],[2,2],[2,1]], k = 5

Output: 1

Explanation:

Select the points `(0, 0)`, `(0, 1)`, `(0, 2)`, `(1, 2)`, and `(2, 2)`.

Constraints:

* `1 <= side <= 109` * `4 <= points.length <= min(4 * side, 15 * 103)` * `points[i] == [xi, yi]` * The input is generated such that: * `points[i]` lies on the boundary of the square. * All `points[i]` are **unique**. * `4 <= k <= min(25, points.length)`

Code Snippets

C++:

```
class Solution {
public:
```

```
int maxDistance(int side, vector<vector<int>>& points, int k) {

}
};
```

Java:

```
class Solution {
public int maxDistance(int side, int[][] points, int k) {

}
}
```

Python3:

```
class Solution:
def maxDistance(self, side: int, points: List[List[int]], k: int) -> int:
```