

# Problem 3710: Maximum Partition Factor

## Problem Information

**Difficulty:** Hard

**Acceptance Rate:** 30.02%

**Paid Only:** No

**Tags:** Array, Binary Search, Depth-First Search, Breadth-First Search, Union Find, Graph

## Problem Description

You are given a 2D integer array `points`, where `points[i] = [xi, yi]` represents the coordinates of the `i`th point on the Cartesian plane.

The **Manhattan distance** between two points `points[i] = [xi, yi]` and `points[j] = [xj, yj]` is  $|xi - xj| + |yi - yj|$ .

Split the `n` points into **exactly two non-empty** groups. The **partition factor** of a split is the **minimum** Manhattan distance among all unordered pairs of points that lie in the same group.

Return the **maximum** possible **partition factor** over all valid splits.

Note: A group of size 1 contributes no intra-group pairs. When `n = 2` (both groups size 1), there are no intra-group pairs, so define the partition factor as 0.

**Example 1.**

**Input:** `points = [[0,0],[0,2],[2,0],[2,2]]`

**Output:** 4

**Explanation.**

We split the points into two groups: `{[0, 0], [2, 2]}` and `{[0, 2], [2, 0]}`.

\* In the first group, the only pair has Manhattan distance  $|0 - 2| + |0 - 2| = 4$ .


\* In the second group, the only pair also has Manhattan distance  $|0 - 2| + |2 - 0| = 4$ .

The partition factor of this split is  $\min(4, 4) = 4$ , which is maximal.

**Example 2:**

**Input:** points = [[0,0],[0,1],[10,0]]

**Output:** 11

**Explanation:** 

We split the points into two groups:  $\{(0, 1), (10, 0)\}$  and  $\{(0, 0)\}$ .

\* In the first group, the only pair has Manhattan distance  $|0 - 10| + |1 - 0| = 11$ .

\* The second group is a singleton, so it contributes no pairs.

The partition factor of this split is  $11$ , which is maximal.

**Constraints:**

$2 \leq \text{points.length} \leq 500$  \*  $\text{points}[i] = [x_i, y_i]$  \*  $-108 \leq x_i, y_i \leq 108$

## Code Snippets

**C++:**

```
class Solution {
public:
    int maxPartitionFactor(vector<vector<int>>& points) {

    }
};
```

**Java:**

```
class Solution {
    public int maxPartitionFactor(int[][] points) {
```

```
}  
}
```

### Python3:

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