

## Problem 7 – Star Clusters

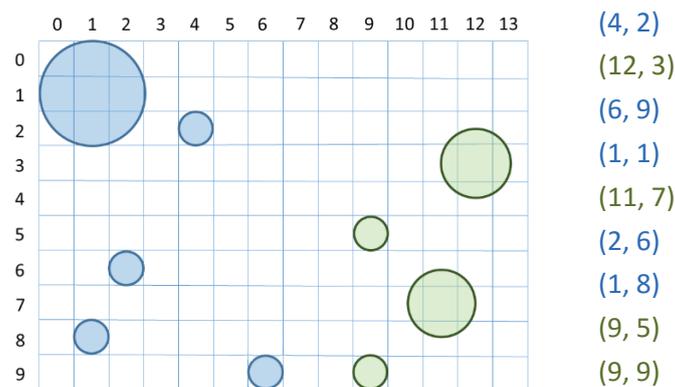
A set of **stars** is given by their coordinates in Euclidean coordinate system. It is known that the stars belong to exactly **C star clusters**. Each cluster holds at least one star and each star belongs to exactly one cluster.

The **center** of given cluster is a point with coordinates which are mean-average of the coordinates of all stars in the cluster.

A **star belongs to certain star cluster** when the distance from the star to the cluster's center is less than the distances from the star to the centers of all other clusters.

Your task is to find the **centers of all star clusters** along with the **number of stars in each cluster**.

Example: at the figure below we have **2 star clusters** with centers **(2.8, 5.2)** and **(10.25, 6)** and total **9 stars**:



### Input

- The input is read from the console.
- On the first line, there is the number of star clusters **C**.
- The next **C** lines contain the star cluster names and the coordinates of one representative star from each cluster. Each coordinate is given in the form **(X, Y)**.
- The next (zero or more) lines hold the coordinates of the other stars (except the ones which have already been given). Each line contains one or more stars separated by a single space. No star is split between lines.
- For each star we are given the coordinates of its center (the star size is not important). Each coordinate is given as ordered pairs in the form **(X, Y)**. The **X** axis is horizontal, and the **Y** axis is vertical. The top-left pixel has coordinates (0, 0),
- The last line contains the word **end** only.
- All coordinates in the input are unique.
- The stars are given in arbitrary order.
- Each star belongs to exactly one cluster (cannot be at the middle of several clusters).

### Output

- The output consists of **C** lines.
- For each star cluster, print **its center** and the **number of stars is it**.
  - Round the coordinates to the nearest integer using the standard **Banker's rounding**. For example **3.14** is rounded to **3**; **4.87** is rounded to **5**; **2.5** is rounded to **2** and **5.5** is rounded to **6**.
  - Sort the clusters by name in alphabetical order.
  - In the picture above, the centers of the clusters are at coordinates **(2.8, 5.2)** and **(10.25, 6)**. They are rounded to **(3, 5)** and **(10, 6)**.

## Constraints

- The number of clusters **C** is an integer in the interval [1...300].
- The number of stars is an integer in the range [1...300].
- Each cluster holds at least one star. The cluster names contain only letters and digits.
- The image is at most 10000 by 10000 pixels large (100 megapixels). There is at most one star at each pixel.
- Time limit: **100 ms**. Allowed memory: **16 MB**.

## Sample Input and Output

| Input   | Output   | Explanation |
|---|--|-------------|
| 2<br>NGC7209 (4, 2)<br>NGC7243 (12, 3)<br>(6, 9) (1, 1) (11, 7)<br>(2, 6) (1, 8) (9, 5)<br>(9, 9)<br>end  | NGC7209 (3, 5) -> 5 stars<br>NGC7243 (10, 6) -> 4 stars  |             |
| 5<br>NGC133 (1, 1)<br>NGC189 (12, 0)<br>NGC129 (7, 5)<br>NGC103 (1, 8)<br>NGC225 (12, 8)<br>(13, 7) (10, 1) (11, 1)<br>(5, 5) (12, 2) (0, 9)<br>(6, 4) (10, 8) (13, 1)<br>end | NGC103 (0, 8) -> 2 stars<br>NGC129 (6, 5) -> 3 stars<br>NGC133 (1, 1) -> 1 stars<br>NGC189 (12, 1) -> 5 stars<br>NGC225 (12, 8) -> 3 stars |             |
| 1<br>NGC884 (11, 4)<br>(11, 0)<br>(4, 1) (6, 2) (5, 4)<br>(8, 3) (7, 6)<br>(5, 6) (5, 8)<br>(9, 6)<br>end   | NGC884 (7, 4) -> 10 stars  |             |