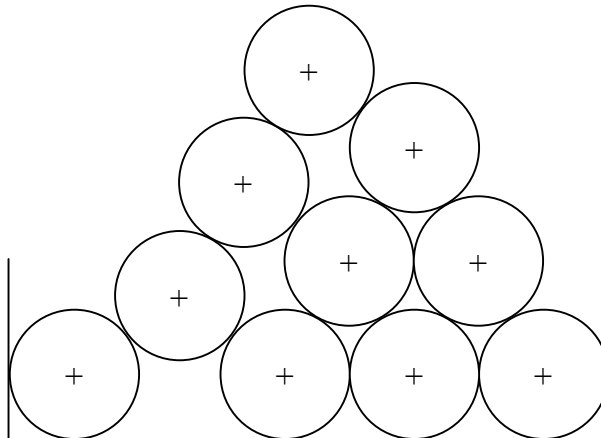


## Problem 5: Stacking Cylinders

Cylinders (for example, oil drums) with a radius of one foot are stacked in a rectangular bin so that in a side view (as shown below) they look like a set of stacked circles. The cylinders in the bottom row (row 0) rest on the floor of the bin. Each cylinder in row  $k$  (for  $k > 0$ ) rests on two cylinders in row  $k-1$ , which is the row below row  $k$ . Each row has one fewer cylinders than the row below it.



Given the position of the centers (show as "+" in the preceding illustration) of each cylinder on the bottom row, you are to find the position of the center of the cylinder on the top row.

### Input

The input will contain multiple cases. The input for each case will begin with a positive non-zero integer  $N$  that indicates the number of cylinders on the bottom row. This will be followed by  $N$  real numbers giving the  $X$  coordinates of the centers of the cylinders on the bottom row. The  $Y$  coordinates of these cylinders are all 1.0 since the cylinders are resting on the floor of the bin, at which point  $Y$  is 0.0. The cylinders cannot overlap, and no cylinder in row  $k$  touches a cylinder in row  $k-2$ . The last input case is followed by a single integer 0.

### Output

For each case display the case number (starting with 1 and increasing sequentially), and the  $X$  and  $Y$  coordinates of the topmost cylinder. Display each coordinate with four fractional digits.

### Sample Input

```
4 1.0 4.4 7.8 11.2
1 1.0
6 1.0 3.0 5.0 7.0 9.0 11.0
10 1.0 3.0 5.0 7.0 9.0 11.0
    13.0 15.0 17.0 20.4
5 1.0 4.4 7.8 11.2 14.6
0
```

### Output for the Sample Input

```
Case 1: 6.1000 4.1607
Case 2: 1.0000 1.0000
Case 3: 6.0000 9.6603
Case 4: 10.7000 15.9100
Case 5: 7.8000 5.2143
```