You are playing a game where it is possible to place defensive towers on the map. They are not like any other defense towers though. They will only protect the area within the convex hull formed by them. However, you cannot place any number of towers, because that will be really unfair. The towers can only be placed on a tower mount. There are several tower mount throughout the map, only one tower can be placed on a tower mount. If you can only place exactly N towers out of P tower mount locations, where $N \leq P$, what is the maximum area that can be covered by the towers?

Input

There will be T ($T \leq 100$) test cases. Each case contains two integers P and N ($3 \leq N \leq P \leq 100$) as described in the statement. Then there will be P pairs of integers (x, y) denoting the coordinates of tower mounts, $0 \leq x, y \leq 1000$. Test cases will be separated by blank lines.
    Note that, 50% of the test cases are randomly generated.

Output

For each case, print the test case number starting with 1, and then a real number denoting the maximum possible area. The output area should be rounded to three decimal places. It is guaranteed the area will be positive.

Sample Input

```
3

7 4
2 2
1 5
6 1
5 5
3 7
7 6
9 4

3 3
0 0
1 1
0 1

4 4
0 1000
1000 0
1000 1000
0 0
```

Sample Output

```
Case 1: 24.000
Case 2: 0.500
Case 3: 1000000.000
```