

Gingerbread

Lea loves cakes and spent her weekend baking some of them. She also made a gingerbread man as a present for her friend Bea. They do not meet often since Bea lives in another part of the country, but from time to time they send letters or small gifts to each other. This time, the gingerbread should be the gift.

When Lea brought it to the post office the officer complained about the gift's weight. The weight is just above the limit for a reasonable price, so Lea has to remove some of the gingerbread. Since she baked a nice (convex) figure, she wants to remove a little from the corners of the gingerbread in the following way: For each edge she marks where $\frac{1}{m}$ of the edge length is (from both directions) for an integer m . Now, there are two markers next to each vertex and she cuts the vertex along the line between these markers. But is this already enough?

Input

The first line of the input contains an integer t . t test cases follow, each of them separated by a blank line.

Each test case starts with a line containing two integers n and m where n is the number of vertices of the gingerbread man and m is the integer given above. n lines follow describing the vertices. The i -th line contains two integers x_i and y_i describing the coordinates of the i -th vertex.

Output

For each test case, output one line containing "Case # i : x " where i is its number, starting at 1, and x is the ratio between the removed area and the total area of the gingerbread before cutting it. The number should be printed as a rational, e.g. as a/b for two integers a and b . The rational does not need to be simplified. Each line of the output should end with a line break.

Constraints

- $1 \leq t \leq 20$
- $3 \leq n \leq 1000$
- $2 \leq m \leq 1000$
- $0 \leq x_i, y_i \leq 1000$ for all $1 \leq i \leq n$
- The gingerbread will always be convex.
- The points will be given in clockwise or counter-clockwise order.

Sample Input 1

```
2
4 2
1 0
1 1
0 1
0 0

3 10
20 0
0 20
1 1
```

Sample Output 1

```
Case #1: 1/2
Case #2: 3/100
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Sample Input 2

8
5 96
82 395
96 446
666 862
855 996
285 506

4 990
311 318
974 475
332 394
77 287

3 828
332 59
118 981
904 105

4 558
825 462
573 575
127 304
639 284

7 48
928 669
919 803
837 842
275 972
170 414
209 104
787 55

7 709
661 162
974 323
985 803
206 542
67 429
27 170
28 97

5 263
983 359
943 900
228 821
14 694
538 15

4 857
580 163
167 745
364 826
601 516

Sample Output 2

Case #1: 86719/640078848
Case #2: 1/490050
Case #3: 1/228528
Case #4: 1/155682
Case #5: 56879/148939776
Case #6: 733768/441494165999
Case #7: 1412644/73812937491
Case #8: 2/734449