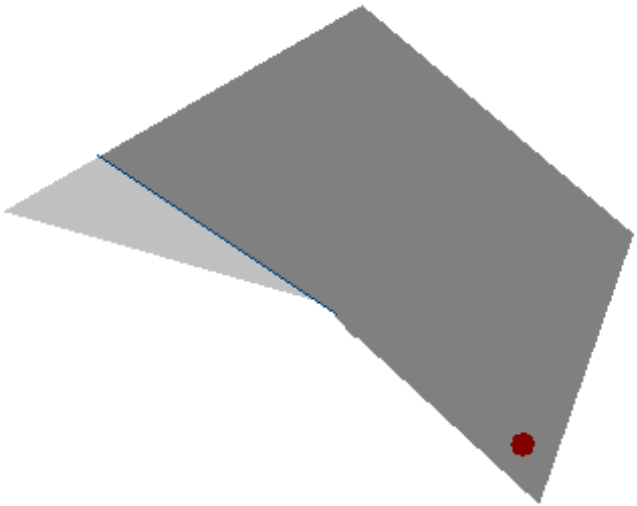


10907 Art Gallery

The ancient art gallery is a special one and it is convex in shape. But recently due to the extension, one of its vertex becomes concave (a vertex which produces an angle greater than 180 degree). Previously, the whole art gallery was visible by the lights. But it may not be the case now. The authority wants to know the area covered by each of the light (Just turn on one light and keep others off) now. In the following figure, dark region shows the area covered by the light which is on.



Art Gallery

Input

Each dataset will start with a positive integer, N ($1 \leq N \leq 20$). In next few lines there will be N Cartesian coordinates defining the art gallery. The points will be in anti-clockwise order. The coordinates will be integer and their absolute value will not exceed 1000. Then in next line there will be a positive integer L . Following L lines will contain the coordinates of the lights which will also be integers. The lights are guaranteed not to be outside the gallery. Exactly one vertex of the gallery will be concave.

Input is terminated by EOF.

Output

For each set of input print 'Gallery # i ' where i is the number of gallery to be considered (starting with 1). In next L lines print the area covered by j 'th light. Use two digits after decimal point in case of covered area.

Sample Input

```
5
0 0
50 50
100 0
100 100
0 100
2
49 50
50 51
```

Sample Output

```
Gallery #1
6250.00
7500.00
```