

Problem J. Vale of Eternal

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 512 megabytes

To ask why we fight?

Is to ask why the leaves fall?

It is in the nature.

Perhaps there is a better question.

Why do we fight?

To protect home and family,

To preserve balance and bring harmony.

For my kind,

The true question is what is worth fighting for.

-CG<Mists of Pandaria>

Chen is practicing Kungfu. He uses Chi Burst to make energy points split.

Initially, there are n energy points on the infinite 2D plane, in every second, every energy point will check its four neighbouring positions (up $(0, 1)$, down $(0, -1)$, left $(-1, 0)$, right $(1, 0)$) If there is no energy point at that position, a new energy point will be generated at that position.

Chen would like to know the progress of the practice in advance. He will give you q queries, each query consists of a single integer t , and you need to find the area of the convex polygon constructed by all energy points after t seconds.

Input

The first line contains a single integer $T(1 \leq T \leq 11)$, denoting the number of test cases. In each test case, the first line contains two integers $n, q(1 \leq n, q \leq 2 * 10^5)$, denoting the number of points initially and the number of queries.

The following n lines, the i -th line contains two integers $x, y(0 \leq x, y \leq 10^8)$, denoting the coordinate of the i -th initial energy point.

Then following q lines, each line contain one integer $t(0 \leq t \leq 10^8)$, denoting the number of seconds.

It's guaranteed that $\sum n \leq 5 * 10^5, \sum q \leq 5 * 10^5$.

Output

For each query, output a single line, denoting the answer, your answer should be rounded to one decimal place.

Example

standard input	standard output
2	11.0
3 3	24.0
2 3	41.0
4 3	27.0
1 1	45.0
1	67.0
2	
3	
3 3	
4 1	
3 4	
2 1	
2	
3	
4	