Innovative Washing Machine

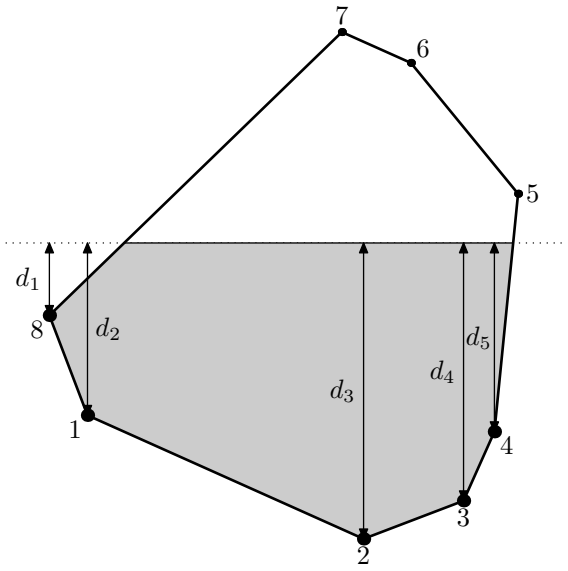
Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

You are asked to help a team that participates in "Innovation Workshop" — an event where teams of students invent and prototype their innovative ideas. One of the teams developed a new innovative washing machine that significantly reduces the usage of energy needed for laundry.

The innovative idea was to use a convex polygon instead of a circle for the shape of a washing machine drum. You are given this polygon. A drum is rotating around some fixed point inside the polygon with a constant speed of 1 turn in 1 second.

Currently, the prototype is built and testing is started. There are s litres of water in the drum. At each moment of time, water under the influence of gravity occupies a region with area s at the bottom of the drum.

Vertices of the polygon that are underwater are under pressure. By Pascal's law, we know that pressure is proportional to depth. Let's define by $d_1, d_2, \ldots, d_k$ depths of the vertices that are underwater at some moment of time, k is the number of underwater vertices. Let's define the *pressure imbalance* as the average difference between underwater vertex depth and the maximum underwater vertex depth, i.e. $\frac{1}{k}\sum_{i=1}^{k}\left(\max_{j=1}^{k} d_j - d_i\right)$. Note that the order of d_i is not important.



The polygon from the third test case is rotated. Vertices 1, 2, 3, 4, 8 are underwater.

To select the optimal shape of the drum, the team wants to know the expected value of pressure imbalance for the moment of time selected uniformly from segment $[0, 1]$ (in seconds). Please help the team to calculate this value.

Input

The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases. The next lines contain descriptions of test cases.

The first line contains two integers n, s ($3 \le n \le 2 \cdot 10^5$, $s \ge 1$) — the number of vertices in the polygon and the number of litres of water inside the drum. It is guaranteed that s is less than the area of the polygon.

Each of the next n lines contains two integers x_i, y_i ($|x_i|, |y_i| \le 10^8$) — coordinates of polygon vertices.

It is guaranteed that the given points form a convex polygon. The area of the polygon is positive and no two consecutive segments are collinear. The vertices of the polygon are given in counterclockwise order.

The sum of n for all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, print a single real number — the expected value of pressure imbalance for a random uniform moment of time.

Your answer will be accepted if its absolute or relative error does not exceed 10^{-5}; formally, if p is your answer, and j is the jury's answer, this should hold: $\frac{|p-j|}{\max\{1,|j|\}} \leq 10^{-5}$.

Example

standard input	standard output
4 4 2 0 0 2 0 2 2 0 2 3 1 1 -1 0 1 -1 -1 8 18 -2 1 -2 -3 -1 -4 0 -4 3 -3 4 -1 4 0 -1 2 4 1 99999998 99999999 99999999 99999998 100000000 99999999 99999999 100000000	0.3729232286 0.1379212354 1.3663189952 0.2636965438