Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

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Sommersemester 2017

Woche 09 – (Adv.) Competitive Programming

Abgabe 26.06.2017 17:00 Uhr, über das Judge-Interface

Aufgabe 1 (destructiveart)**.** (100 Points – 1 seconds timelimit)

Your (imaginary) younger sibling has, to their guardians joy, created a work of art by hammering nails into the living room floor. Since ~~the damage has already been done~~ the art-making has already happened, their guardians decide to protect it properly for posterity by wrapping some red thread around the outermost nails (such that all nails are contained within). To not increase the costs unnecessarily, you have been asked to determine the length of thread required to surround all the nails.

After publishing pictures of the finished Work Of Art™, you have been inundated by requests from other guardians, who's charges have attempted to copy your siblings work.

Input Read one line containing n, the number of artworks to process. Then for each artwork read one line containing k ($0 < k \leq 2000000$) the number of nails in the artwork, followed by k lines containing x and y ($0 \leq x, y \leq 200000000$), the coordinates of one nail.

Output For each artwork print one line containing the length of the thread required to wrap once around all the nails. Print the (rounded) result with three decimal digits. Use 64 bit floating point values whenever a calculation may produce a fractional result.

Points There are three groups of test sets:

- *easy:* For the first group worth 25 Points, you can assume, that $k \leq 200$ and $a, b \leq 1000$.
- *medium:* For the second group worth 35 Points, you can assume, that $k \leq 30000$ and $a, b \leq 200000$.
- *hard:* For the third group of test sets worth 40 Points, there are no additional assumptions.

Sample Input

```
1
8
0 0
0 4
4 0
4 4
1 1
1 3
3 3
3 1
```

Sample Output

```
16.000
```