

## Problem F. Lake

Input file: *standard input*  
Output file: *standard output*  
Time limit: 1 second  
Memory limit: 256 mebibytes

There is a lake with perimeter  $L$ , and  $n$  ports are placed on the boundary of this lake. The ports are numbered 1 through  $n$ . If you walk  $x_i$  (distance) from the port 1 along the boundary in clockwise direction, you reach the port  $i$ . There are two ways to move between two points on the boundary of the lake:

- Walk along the boundary of the lake (either in clockwise or counterclockwise direction). Your speed is one unit distance per one unit time.
- Move from a port to another port using a boat. Boats are extremely fast, so you can ignore the time required in this method.

Snuke decided to add  $k$  new ports on the boundary of the lake. When Snuke chooses the optimal places for new ports, compute the minimal possible value  $T$  such that it is possible to travel between any two points on the boundary of the lake in time  $T$ .

### Input

First line of the input contains three integers  $L$ ,  $n$  and  $k$ . Then  $n$  lines follow;  $i$ -th of them contains one integer  $x_i$ .

Constraints:

- $1 \leq L \leq 10^9$
- $2 \leq n \leq 10^5$
- $1 \leq k \leq 10^9$
- $0 = x_1 < x_2 < \dots < x_n < L$

### Output

Output the minimal possible value of  $T$  described in the statement. The absolute error or the relative error of your output must be at most  $10^{-6}$ .

### Examples

standard input	standard output
10 2 1 0 4	3.500000000000
100 10 1000 0 3 11 18 34 46 55 79 84 90	0.099585062241

## Note

For the first sample, in the optimal solution, the location of the new port should be 7 (measured clockwise from the port 1).