Vacuum A Round



After cleaning up the competition during a programming championship (congratulations!), you were asked by the contest director to help clean up the competition, literally. The contest floor has been cleared of all tables, workstations, *etc.* and is now ready to be vacuumed.

The contest room is perfectly circular in shape. Around the perimeter of the room are N electrical outlets, spaced irregularly along the wall. Though you've been provided a heavy-duty vacuum, it unfortunately has a power cord with limited reach. When plugged into an outlet on the wall, it does not allow the vacuum to reach the center of the room. Given this fact, the contest director's instructions are very precise – you are to select exactly K of the N outlets such that, vacuuming from all of these K outlets, you vacuum the maximum total area possible, thus minimizing the unvacuumed area in any unreached regions (which must each be carefully swept by hand with a small broom).

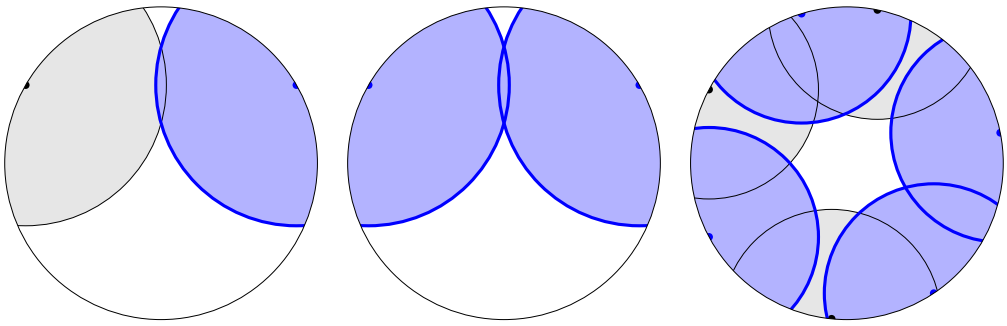


Figure 1: Illustrations of the Sample Problems with the optimal solution selected in blue

Input

The first line contains four integers, the radius of the room R ($2 \leq R \leq 1000$), the total number of outlets along the wall N ($1 \leq N \leq 120$), the number of outlets you are allowed to use K ($1 \leq K \leq N$), and the length of the vacuum's power cord C ($1 \leq C < R$).

The next N lines contain the locations of the outlets, each specified as a decimal angle a_i relative to the center of the room, given in radians, with exactly 4 digits of decimal precision. All angles are distinct and are provided in sorted order ($0 \leq a_1 < a_2 < ... < a_N < 2\pi$).

Output

You must output the maximum area that can be vacuumed by using exactly K of the N outlets. Your answer must be within an absolute or relative error of 10^{-5}.

Sample Input 1

```
10 2 1 9
0.5236
2.6180
```

Sample Output 1

```
102.40700786930201
```

Sample Input 2

```
10 2 2 9
0.5236
2.6180
```

Sample Output 2

```
202.58640910182371
```

Sample Input 3

```
10 7 4 7
0.1963
1.3744
1.8653
2.6507
3.6325
4.6142
5.3014
```

Sample Output 3

```
248.59910531976785
```