Linear Averaging

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

You are given integers n, m, k and a sequence consisting of n integers $a_i \in [1, m]$. You can **at most once** choose an interval of the sequence (a contiguous subsequence) of length k and *average it*, that is, replace the elements of this interval with their arithmetic mean. This process takes 1 unit of time, and each element of the interval changes uniformly with a constant speed. For example, the interval with elements $(3, 9, 5, 1)$ has an average of $\frac{3+9+5+1}{4} = 4\frac{1}{2}$, so after time $t = \frac{2}{3}$ the values are $(4, 6, 4\frac{2}{3}, 3\frac{1}{3})$, and after time $t = 1$ they become $(4\frac{1}{2}, 4\frac{1}{2}, 4\frac{1}{2}, 4\frac{1}{2})$. Formally, after time $t \in [0, 1]$, an element with initial value a equals $a' = \bar{a} \cdot t + a \cdot (1 - t)$, where $\bar{a}$ is the mean of the interval. Only the elements in the chosen interval change.

Independently for each number x from 1 to m, your task is to determine how quickly the value x can appear anywhere in the sequence, by performing the process of averaging some interval. After how much time is this possible? Print `-1` if it is not possible to obtain the number x.

Input

The first line contains three integers n, m and k ($1 \le k \le n \le 300\,000$; $1 \le m \le 500\,000$), denoting respectively the length of the sequence, the upper limit of values, and the length of the modified interval.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le m$).

Output

Print m lines. In the x-th line, print the minimum required time (a real number) needed to obtain the number x, or print the integer `-1` (without a dot) if it is not possible using at most one averaging operation.

The acceptable absolute error is 10^{-9}. You may print up to 20 digits after the decimal point.

Examples

standard input	standard output
8 10 4 3 9 5 1 1 1 1 10	0.0000000000 0.2857142857 0.0000000000 0.3333333333 0.0000000000 0.5925925926 0.4000000000 0.2000000000 0.0000000000 0.0000000000
1 3 1 2	-1 0.0000000000 -1

Note

In the first test, we can average one interval of length $k = 4$. The exact results are $0, \frac{2}{7}, 0, \frac{1}{3}, 0, \frac{16}{27}, \frac{2}{5}, \frac{1}{5}, 0, 0$.

The number $x = 6$ can be obtained the earliest at time $t = \frac{16}{27} \approx 0.5926$, by averaging the last four numbers $(1, 1, 1, 10)$ to the mean $\frac{13}{4} = 3\frac{1}{4}$. The last element is then equal to $3\frac{1}{4} \cdot \frac{16}{27} + 10 \cdot \frac{11}{27} = 6$.

The number $x = 7$ can be obtained the earliest at time $t = \frac{2}{5}$, by averaging the interval $(9, 5, 1, 1)$ to the mean 4. The first of these elements is then equal to $4 \cdot \frac{2}{5} + 9 \cdot \frac{3}{5} = 7$.

In the second test, averaging a single element does not change its value. The result for $x = 2$ is $t = 0$, whereas the numbers 1 and 3 are not reachable.