Croc Champ 2013 - Finals

A. Morning run

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

People like to be fit. That's why many of them are ready to wake up at dawn, go to the stadium and run. In this problem your task is to help a company design a new stadium.

The city of N has a shabby old stadium. Many people like it and every morning thousands of people come out to this stadium to run. The stadium can be represented as a circle, its length is exactly l meters with a marked start line. However, there can't be simultaneous start in the morning, so exactly at 7, each runner goes to his favorite spot on the stadium and starts running from there. Note that not everybody runs in the same manner as everybody else. Some people run in the clockwise direction, some of them run in the counter-clockwise direction. It mostly depends on the runner's mood in the morning, so you can assume that each running direction is equiprobable for each runner in any fixed morning.

The stadium is tiny and is in need of major repair, for right now there only is one running track! You can't get too playful on a single track, that's why all runners keep the same running speed — exactly 1 meter per a time unit. Nevertheless, the runners that choose different directions bump into each other as they meet.

The company wants to design a new stadium, but they first need to know how bad the old one is. For that they need the expectation of the number of bumpings by t time units after the running has begun. Help the company count the required expectation. Note that each runner chooses a direction equiprobably, independently from the others and then all runners start running simultaneously at 7 a.m. Assume that each runner runs for t time units without stopping. Consider the runners to bump at a certain moment if at that moment they found themselves at the same point in the stadium. A pair of runners can bump more than once.

Input

The first line of the input contains three integers n, l, t ($1 \le n \le 10^6$, $1 \le l \le 10^9$, $1 \le t \le 10^9$). The next line contains n distinct integers $a_1, a_2, ..., a_n$ ($0 \le a_1 < a_2 < ... < a_n < l$), here a_i is the clockwise distance from the start line to the i-th runner's starting position.

Output

Print a single real number — the answer to the problem with absolute or relative error of at most 10^{-6}.

Sample test(s)

input
2 5 1 0 2

output
0.2500000000

input
3 7 3 0 1 6

output
1.5000000000

Note

There are two runners in the first example. If the first runner run clockwise direction, then in 1 time unit he will be 1m away from the start line. If the second runner run counter-clockwise direction then in 1 time unit he will be also 1m away from the start line. And it is the only possible way to meet. We assume that each running direction is equiprobable, so the answer for the example is equal to $0.5 \cdot 0.5 = 0.25$.

B. Context Advertising

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Advertising has become part of our routine. And now, in the era of progressive technologies, we need your ideas to make advertising better!

In this problem we'll look at a simplified version of context advertising. You've got a text, consisting of exactly n words. A standard advertising banner has exactly r lines, each line can contain at most c characters. The potential customer always likes it when they can see lots of advertising, so you should determine which maximum number of consecutive words from the text can be written on the banner. Single words in one line of the banner should be separated by spaces. You are allowed to insert more than one space at once. Note that you are not allowed to break the words, that is, each word in the text must occupy exactly one line in the banner. Besides, you cannot change the word order, that is, if you read the banner text consecutively, from top to bottom and from left to right, you should get some consecutive part of the advertisement text.

More formally, the statement can be written like that. Let's say that all words are indexed from 1 to n in the order in which they occur in the advertisement text. Then you have to choose all words, starting from some i-th one and ending with some j-th one $(1 \le i \le j \le n)$, so that all of them could be written on the banner. There must be as many words as possible. See the samples for clarifications.

Input

The first input line contains three integers n, r, c $(1 \le n, r, c \le 10^6; r \times c \le 10^6)$. The next line contains a text, consisting of n words. The words consist only of lowercase English letters and are not empty. The words in the lines are separated by single spaces. The total number of characters in all words doesn't exceed $5 \cdot 10^6$.

Output

Print at most r lines, in each line print at most c characters — the optimal advertisement banner. If there are multiple advertisement banners, print any of them.

Note that some lines of the banner **can be empty**. You are allowed not to print such lines.

Sample test(s)

input
```
9 4 12
this is a sample text for croc final round
```
output
```
this is a
sample text
for croc
final round
```

input
```
9 1 9
this is a sample text for croc final round
```
output
```
this is a
```

input
```
6 2 3
croc a a a croc a
```
output
```
a a
a
```

input
```
2 2 5
first second
```
output
```
first
```

C. Memory for Arrays

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You get to work and turn on the computer. You start coding and give little thought to the RAM role in the whole process. In this problem your task is to solve one of the problems you encounter in your computer routine.

We'll consider the RAM as a sequence of cells that can contain data. Some cells already contain some data, some are empty. The empty cells form the so-called *memory clusters*. Thus, a memory cluster is a sequence of some consecutive empty memory cells.

You have exactly n memory clusters, the i-th cluster consists of a_i cells. You need to find memory for m arrays in your program. The j-th array takes 2^{b_j} consecutive memory cells. There possibly isn't enough memory for all m arrays, so your task is to determine what maximum number of arrays can be located in the available memory clusters. Of course, the arrays cannot be divided between the memory clusters. Also, no cell can belong to two arrays.

Input

The first line of the input contains two integers n and m ($1 \le n, m \le 10^6$). The next line contains n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^9$). The next line contains m integers $b_1, b_2, ..., b_m$ ($1 \le 2^{b_i} \le 10^9$).

Output

Print a single integer — the answer to the problem.

Sample test(s)

input
5 3 8 4 3 2 2 3 2 2

output
2

input
10 6 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0 0

output
6

Note

In the first example you are given memory clusters with sizes 8, 4, 3, 2, 2 and arrays with sizes 8, 4, 4. There are few ways to obtain an answer equals 2: you can locate array with size 8 to the cluster with size 8, and one of the arrays with size 4 to the cluster with size 4. Another way is to locate two arrays with size 4 to the one cluster with size 8.

In the second example you are given 10 memory clusters with size 1 and 6 arrays with size 1. You can choose any 6 clusters and locate all given arrays to them.

D. Tennis Rackets

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Professional sport is more than hard work. It also is the equipment, designed by top engineers. As an example, let's take tennis. Not only should you be in great shape, you also need an excellent racket! In this problem your task is to contribute to the development of tennis and to help to design a revolutionary new concept of a racket!

The concept is a triangular racket. Ant it should be not just any triangle, but a regular one. As soon as you've chosen the shape, you need to stretch the net. By the time you came the rocket had n holes drilled on each of its sides. The holes divide each side into equal $n + 1$ parts. At that, the m closest to each apex holes on each side are made for better ventilation only and you cannot stretch the net through them. The next revolutionary idea as to stretch the net as obtuse triangles through the holes, so that for each triangle all apexes lay on different sides. Moreover, you need the net to be stretched along every possible obtuse triangle. That's where we need your help — help us to count the number of triangles the net is going to consist of.

Two triangles are considered to be different if their pictures on the fixed at some position racket are different.

Input

The first and the only input line contains two integers n, $m (1 \le n \le 32000, 0 \le m \le \frac{n}{2})$.

Output

Print a single number — the answer to the problem.

Sample test(s)

input
3 0
output
9

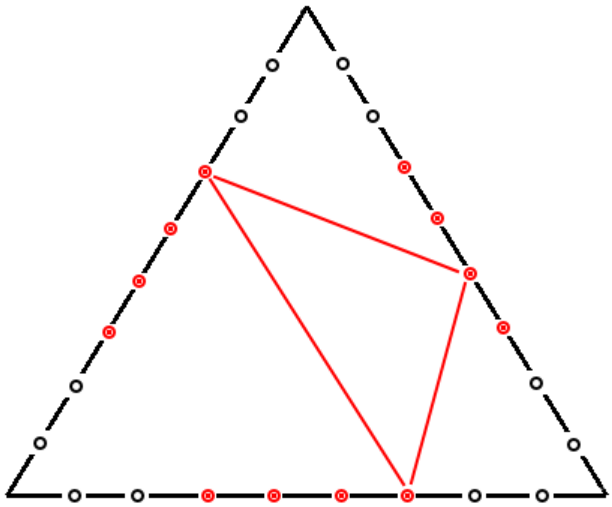
input
4 0
output
24

input
10 1
output
210

input
8 4
output
0

Note

For the following picture $n = 8$, $m = 2$. White circles are the holes for ventilation, red circles — holes for net stretching. One of the possible obtuse triangles is painted red.



E. Sheep

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Information technologies are developing and are increasingly penetrating into all spheres of human activity. Incredible as it is, the most modern technology are used in farming!

A large farm has a meadow with grazing sheep. Overall there are n sheep and each of them contains a unique number from 1 to n — because the sheep need to be distinguished and you need to remember information about each one, and they are so much alike! The meadow consists of infinite number of regions numbered from 1 to infinity. It's known that sheep i likes regions from l_i to r_i.

There are two shepherds taking care of the sheep: First and Second. First wakes up early in the morning and leads the sheep graze on the lawn. Second comes in the evening and collects all the sheep.

One morning, First woke up a little later than usual, and had no time to lead the sheep graze on the lawn. So he tied together every two sheep if there is a region they both like. First thought that it would be better — Second would have less work in the evening, because sheep won't scatter too much, being tied to each other!

In the evening Second came on the lawn, gathered the sheep and tried to line them up in a row. But try as he might, the sheep wouldn't line up as Second want! Second had neither the strength nor the ability to untie the sheep so he left them as they are, but with one condition: he wanted to line up the sheep so that the maximum distance between two tied sheep was as small as possible. The distance between the sheep is the number of sheep in the ranks that are between these two.

Help Second find the right arrangement.

Input

The first input line contains one integer n ($1 \le n \le 2000$). Each of the following n lines contains two integers l_i and r_i ($1 \le l_i, r_i \le 10^9$; $l_i \le r_i$).

Output

In the single output line print n space-separated numbers — the sought arrangement of the sheep. The i-th value in the line must represent the number of the sheep that took the i-th place from left in the optimal arrangement line.

If there are multiple optimal arrangements, print any of them.

Sample test(s)

input
3 1 3 5 7 2 4
output
1 3 2

input
5 1 5 2 4 3 6 1 7 2 6
output
2 1 3 5 4

input
4 1 3 4 6 5 7 2 3
output
1 4 2 3