Problem J. Competitions in Belovezhskaya Pusha (Division 2 Only!)

Input file:	`acm.in`
Output file:	`acm.out`
Time limit:	1 second
Memory limit:	256 megabytes

As is well known, the residence of the Belorussian version of Santa Claus (called Dzed Maroz) is located in Belovezhskaya Pusha forest. But few know that at the same place the international ACM competition for New Year characters is held in mid-December. Each team consists of one Dzed Maroz and two Snegurochkas - it's too heavy for a single Snegurochka to drag a drunken bearded man (if you are not familiar with fairy tails, Snegurochka is the granddaughter and helper of Ded Moroz).

This year, our country will also participate in the competition. But first, one simple problem has to be solved. There are N Dzed Marozes and M Snegurochkas, but at least K persons has to stay home, because as early as of December 19th night at least someone has to be working. How many teams will we be able to send to Belovezhskaya Pusha?

For example if $N = 3$, $M = 6$, $K = 2$, the best option is to keep one Dzed Maroz and one Snegurochka home and the remaining characters would form two teams.

Input

The input file contains 3 integers N, M, K. All the numbers are greater than zero and do not exceed 100000.

Output

The only integer should be written to the output file – the maximum number of teams that could be sent to the competition.

Examples

acm.in	acm.out
3 6 2	2

Problem K. Bad Santa (Division 2 Only!)

Input file:	`badsanta.in`
Output file:	`badsanta.out`
Time limit:	2 seconds
Memory limit:	256 megabytes

Willie is an unusual Santa Claus. Once a year on Christmas, he and his partner are robbing another grocery store. Moreover, in the past, he's been in jail, was married more than once, and now Willie is promiscuous and a drunkard. He is a really bad, unbearable Santa!

Now Willie is at vertex numbered 1 of a certain graph and he is eager to get home unnoticed - to the vertex numbered N. But he knows that somewhere near the vertex numbered v_1 there is a policeman who walks along the cycle $v_1 \to v_2 \to ...v_K$, moving from one vertex of the cycle to the next one in one minute.

The policeman has not yet received a gift and he dreams to meet Santa. But Willie is cunning and can either move to the next vertex in one minute or stand still for a minute. Determine how long will is take Willie to get home unnoticed.

Input

The first line of the input file contains 3 integers: N – the number of vertexes in the graph ($5 \le N \le 10^5$); M – the number of edges ($1 \le M \le 10^5$); K – the number of vertexes in the cycle that policeman in walking along ($1 \le K \le 10$).

Each of the next M contains a pair of integers x_i, y_i – the numbers of vertexes that are connected with an undirected edge. All listed edges are distinct. The next line contains K distinct integers $v_1, v_2, ..., v_K$. It's guarantied that edges (v_1, v_2), (v_2, v_3), ..., (v_{k-1}, v_k), (v_K, v_1) exist in the graph.

Output

The minimum time in minutes Willie need to get home must be written to the output file. It means there must not be such a moment when Willie and the policeman are located in the same vertex or are moving along the same edge. If it's impossible for Willie to get home output -1.

Examples

badsanta.in	badsanta.out
5 5 3 1 2 2 3 4 3 4 2 3 5 4 2 3	4

Note

Sample test explanation. During the first minute Willie stands still and waits until the policeman moves to the vertex 2. Then Willie goes to the vertex 2, and the policeman - to the vertex 3. Next Willie - to the vertex 3, policeman - 4. And, finally, after one more minute Willie will arrive to the vertex 5. Thus, the total time is 4 minutes.

Problem L. Khorovod (Division 2 Only!)

Input file:	`circle.in`
Output file:	`circle.out`
Time limit:	3 seconds
Memory limit:	256 megabytes

Tradition of circle dancing called "khorovod"is one of the most ancient traditions in Russia. Khorovods resemble the Sun. They are dating back to the time of the Slavs glorifying Yarylo (the god of sun). Our ancestors circle danced around relic trees and sang sacred songs.

New Year's Eve khorovod is an old tradition, more than two centuries old. In prerevolutionary Russia, children gathered around the tree, and then the main song was performed.

Dancing khorovod usually involves $2N$ people that are evenly distributed on a circle of radius N/π. There are K Santa Clauses among the participants of the circle dance. Naturally, everyone wants to be as close as possible to Santa because of the gifts. Try to find such a position in a khorovod that the sum of distances along the arc to all the Santa Clauses is minimal.

Input

The first line of the input file consists of two integers N and K. $(1 \leq N \leq 10^5, 1 \leq K \leq 2 * N)$. The second line contains K distinct integers – indexes of the points on the circle where Santa Clauses are standing. Points are numbered clockwise from 1 to $2 * N$.

Output

The output file must contain the single integer - the minimal sum of distances from the optimal position to all Santa Clauses along the arc.

Examples

circle.in	circle.out
3 2 4 6	2

Problem M. Letter to Santa Claus (Division 2 Only!)

Input file:	`letter.in`
Output file:	`letter.out`
Time limit:	4 seconds
Memory limit:	256 megabytes

Santa Claus is sorting the letters from children, opening them and reading to himself:

- "Hello, Santa Claus, the beard made of..."– That I have already read, what else?

- "The gifts you brought to us... No, I've read that too.

- Hmm, and what about this letter?

- "Hello, Santa. Dima Petrov, 5 years old, is writing to you. Santa Claus, please, do not throw this letter and do read it to the end, and even better, read it not once but twice! Santa, this is not a spam, this is a real way to earn a lot of money! You just have to learn how to quickly transform one wish into another. The plan is the following: we replace any sequence of characters in the first wish with the same number of identical characters until we get the wish we need..."

- Well, now that's interesting! – said Santa.

Input

The first line of the input file contains the integer N - the number of test cases ($1 \leq N \leq 100$). Next N lines describe test cases. Each test case is given in a single line that consists of two space separated strings - initial wish and desired wish. The strings consist of lowercase latin letters. The strings are of equal length not greater that 50.

Output

Write one number per test case to the output file – the minumum number of transformations Dima described that are required to turn the first wish into the second one. Output answers on a separate lines.

Examples

letter.in	letter.out
2 abcdb aecce ab de	2 2

Note

Sample test explanation: first replace letters "bcdb"with "eeee". Then replace central "ee"with "cc".

Problem N. NP-leap year (Division 2 Only!)

Input file:	`np.in`
Output file:	`np.out`
Time limit:	4 seconds
Memory limit:	256 megabytes

A year is called NP-leap, if it's decimal representation consists only of digits from some set N and the year number is a multiple of P. For example, year 2112 will be NP-leap for $N = 1, 2$ and $P = 3$.

Calculate the number of NP-leap years for given N and P inside the range $[L, R]$.

Input

The first line contains two integers – M and P. M is the number of elements in the set N ($1 \le M \le 10, 1 \le P < 10^{12}$). The second line contains two integers L and R ($1 \le L \le R < 10^{12}$). The third line contains M decimal digits separated by space – the elements of the set N. The digits are pairwise distinct.

Output

Write the single integer to the output file - the number of NP-leap years in the given range.

Examples

np.in	np.out
2 2 2110 2130 1 2	2

Problem O. Santa Claus Bag (Division 2 Only!)

Input file:	`bag.in`
Output file:	`bag.out`
Time limit:	1 second
Memory limit:	256 megabytes

A bag full of gifts is one of the key attributes of Santa. Many children believe that the bag is bottomless. In any case, Santa Claus never allows anyone to touch the bag, and he only himself pulls out gifts. He does it without looking but always gets exactly the gifts the one is waiting for.

Let's assume all the gifts are numbered from 1 to N. Fifth-grader Vasya Pupking who is widely known in certain circles asked for K-th lexicographically smallest subset of the gifts from magic bag. Determine which gifts fifth-grader Vasya will get this year.

Input

Input file consists of two integers N $(1 \le N \le 30)$ and K $(1 \le K \le 2^N)$.

Output

The output file must contain space separated list of gift numbers that Vasya will receive. Numbers must be sorted in the ascending order.

Examples

bag.in	bag.out
`2 1`	`32`

Note

Consider a sample of the lexicographic order of subsets for $N = 3$. It is the following: $, 1, 1, 2, 1, 2, 3, 1, 3, 2, 2, 3, 3$. That is, one subset is less than another if their prefixes in sorted representation are equal and next element is smaller for the former subset.

Problem P. The forest raised a Christmas tree (Division 2 Only!)

Input file:	`fir.in`
Output file:	`fir.out`
Time limit:	1 second
Memory limit:	256 megabytes

M days before Christmas the forest raised a Christmas tree – the rooted tree that has N vertexes and K leaves ($K \le N$, i.e. the tree has K leaves and $N - K$ other vertexes and the root is not considered a leaf). Christmas tree was growing up in the forest and everyday the exact copy of the original Christmas tree grew up out of each leaf. And now it comes to visit us, with lights and garlands bright – calculate how many vertexes our Christmas tree will have on Christmas. Please, output the answer modulo 1000000007.

Input

The input file contains three integers N, K, M. ($1 \le M \le 10^{18}, 1 \le N, K \le 10^8$).

Output

Write the only integer to the output file – the number of vertexes of our Christmas tree on Christmas night.

Examples

fir.in	fir.out
4 2 1	10

Problem Q. Shen Dan Lao Zhen (Division 2 Only!)

Input file:	`guandun.in`
Output file:	`guandun.out`
Time limit:	6 seconds
Memory limit:	256 megabytes

Chinese Santa Claus has very simple name - Shen Dan Lao Zhen. He is also called Dun Che Lao Ren or Sho Hin. Despite the exotic name, habits of Chinese Santa aren't any different. On Christmas Eve he comes to children bedrooms and fills socks hanging on walls with gifts.

Dun Che Lao Ren looks like a wise old man. He has silk robes, his long beard is waving in the wind, and he rides on a donkey.

According to Wikipedia, Guangdong is the most densely populated province of China, and therefore we can assume that all kids live in the points with coordinates $X_i = (A * X_{i-1} + B) \mod 1000007$, $Y_i = (C * Y_{i-1} + D) \mod 1000007$, where "mod"means division remainder and i runs from 1 to 10^8. The point with coordinates (X_0, Y_0) is the origin where Mao himself used to receive gifts and now nobody lives there.

Try to quickly calculate twice the area of the convex hull of places Shen Dan Lao Zhen needs to visit in Guangdong province.

Input

The input file consists of 6 integers X_0, Y_0, A, B, C, D. $(1 \le X_0, Y_0, A, B, C, D < 1000007)$.

Output

Write the single integer to the output file – twice the area of the convex hull of the points $\{(X_i, Y_i), 1 \le i \le 10^8\}$.

Examples

guandun.in	guandun.out
`176 6532 1 3762 1 2716`	`1999963999650`

Problem R. Snowwoman (Division 2 Only!)

Input file:	`baba.in`
Output file:	`baba.out`
Time limit:	1 second
Memory limit:	256 megabytes

Can the question "Where did the snowman come from?"be ever answered?

Snowman (or "snowy women"how they are called) were known in Russia from ancient times. According to a legend, St. Francis of Assisi, while fighting with demons began sculpting snowmen and used to call them his wife and children. Other sources claim that the child's play to construct a snowman is an obvious legacy of the days when a idol made of snow represented the Great Mother in her winter subsistence.

Now let's imagine that there are N balls of snow that are laid out in a row and are numbered from 1 to N. The weights of the first and the last balls are know, and we know that the weight of each ball (except the first and the last one) is greater than the average weight of two adjacent balls by a fixed number d.

Your task is to calculate the weight of the Snowwoman made up of balls numbered I, J and K.

Input

The only line of input file consists of the following integers: N – the number of balls ($3 \le N \le 1000$); m_i – weight of the first ball ($0 < m_1 \le 1000$); m_N – weight of the last ball ($0 < m_N \le 1000$); d – fixed real number ($-1000 \le d \le 1000$); I, J, K – indexes of balls that the Showwoman is made of.

Гарантируется корректность входных данных, т.е. вес любого шара - неотрицательный и числа I, J, K различны.

Output

Write the single number to the output file - the weight of the Snowwoman made of balls numbered I, J and K. The answer must be correct up to 0.0001.

Examples

baba.in	baba.out
`4 10.0 6.0 1.0 1 2 3`	`30.0000000000`

Problem S. Matrix fortune-telling (Division 2 Only!)

Input file:	`matrix.in`
Output file:	`matrix.out`
Time limit:	1 second
Memory limit:	256 megabytes

Winter holidays is a time of waiting for miracles, a time when you can gently lift the veil of mystery and find out what awaits you next year.

Since ancient times, people have tried to penetrate the mystery of existence and look into the future. In old times magic ritual of fortune-telling was preceded by sacrifices and was held in an atmosphere of mysterious solemnity. Fortune-telling was an integral part of life, the outcome of many events depended on it, ranging from the smallest day-to-day decisions to large public affairs.

Times has changed, but desire of a man to look into the future remains. Nowadays, with rapid development of science and technology and ubiquitous use of the Internet, almost any kind of fortune-telling can be found online. You no longer need to go to sauna at midnight in negligee or go to the cemetery scared to death, you can do fortune-telling in comfort instead.

Here is the simplest way of a comfortable fortune-telling. You need to look at the matrix of NxM dimensions filled with 0 and 1 and try to find a square sub-matrix of maximum size such that it is center-symmetric. For matrices of size $n * n$ being center-symmetric means that $a_{i,j} = a_{n+1-i,n+1-j}$. If you succeed, then simply search the matrix on Google to learn what it means, if not - just do not be upset!

Input

The first line of the input file contains 2 integers N and M ($1 \leq N, M \leq 300$) – dimensions of the matrix. Next N lines consist of M characters each – the elements of the matrix. Each element is a single digit, either 0 or 1.

Output

Write the single number to the output file – maximum size of center-symmetric sub-matrix.

Examples

matrix.in	matrix.out

Note

The maximum sub-matrix in the sample test is

1010

0100

0010

0101