Problem A. Dictionary

Input file:	pla.in
Output file:	standard output
Balloon Color:	Red

Hamada hates palindromes, and finds them boring. One day, he was reading random words from the dictionary and wondered: if he has a string S, what is the minimum number of characters he has to change to make this string a non-palindrome? Unfortunately, Hamada cannot figure the answer to this question by himself, can you help him?

A palindrome is a string that reads the same backward as forward. For example: strings "z", "aaa", "wow" and "noon" are palindromes, but strings "pi", "key" and "contest" are not.

Input

The first line contains an integer T - the number of test cases.

Each test case consists of one line that has the string S which consists of lowercase English letters ($2 \leq |S| \leq 200$).

Output

For each test case, print a single line with the answer to this problem.

Example

pla.in	standard output
4 mike aabaa afg noon	0 1 0 1

roblem B. Vowels

Input file: vowels.in
Output file: standard output
Balloon Color: Brown

Given a string S that consists of lowercase English letters, find the minimum number of operations needed to move all the vowels to the beginning of the string (vowels arrangement does not matter).

In one operation: you can swap any two adjacent letters.

Vowels are letters: ("a", "o", "y", "e", "u", "i") and the rest are constants.

Input

The first line contains one integer N ($1 \leq N \leq 10^6$) - the length of the string S.

The second line contains the string S which consists of N lowercase English letters.

Output

Print the minimum number of operations needed to move the vowels to the beginning of the string.

Examples

vowels.in	standard output
3 acm	0
5 insat	2
5 round	2

Note

In the first sample, all the vowels in the string are already at the beginning so 0 operations are needed.

In the second sample, these are the 2 operations needed to move the vowels to the beginning:

$$insat \xrightarrow{\text{swapping the } 3^{rd} \text{ and } 4^{th} \text{ letters}} inast \xrightarrow{\text{swapping the } 2^{nd} \text{ and } 3^{rd} \text{ letters}} ianst$$

Problem C. Teams

Input file:	teams.in
Output file:	standard output
Balloon Color:	Orange

There are N contestants in your university and they all want to participate in the upcoming team contest, the i^{th} contestant has a rating A_i.

Each team consists of 3 members and the difference between the rating of any two members of the same team must be less than or equal to S. Note that a contestant can be a member in at most one team.

Can you figure out the maximum number of teams your university can have?

Input

The first line contains an integer T - the number of test cases.

The first line of each test case contains two integers N and S ($1 \leq N \leq 100, 1 \leq S \leq 10^5$) - the number of contestants and the maximum difference between the ratings of team members, respectively.

The second line of each test case contains N integers $A_1, A_2, .., A_N$ ($1 \leq A_i \leq 10^5$) - the rating of each contestant.

Output

For each test case, print the maximum number of teams that your university can have.

Example

teams.in	standard output
3 5 2 1 7 2 3 4 6 5 7 4 6 2 3 2 3 1 4 5 8	1 2 0

Problem D. Grid

Input file:	equals.in
Output file:	standard output
Balloon Color:	Yellow

Mike has N strings each consists of N small English letter characters, Mike wants to make the N strings equal and he can apply the following operation any number of times he wants.

The operation he can make is to select any pair of strings from the N strings(possibly the same string) and select any pair of characters in these two strings and swap them.

Mike can't figure out if he can make all of the N strings equals or not, can you help him by telling him if it's possible or not?.

Input

The first line contains an integer T - the number of test cases.

The first line of each test case contains an integer N $(1 \leq N \leq 20)$.The number of strings and the length of each string.

Then N lines follow each contains a string S consists of N small English letter characters

Output

For each test case, print "YES"without the quotes if it's possible to make all the strings equal by applying the allowed operation any number of times and print "NO"otherwise.

Example

equals.in	standard output
2 4 acaz awcc bbbb aefh 3 abb baa ccc	NO YES

Problem E. Water and Borders

Input file:	grid.in
Output file:	standard output
Balloon Color:	Gold

One day, Marouene and Ahmed -two of our problem setters- were watching a boring game. To get over this boredom, Marouene challenged Ahmed to a game:

Marouene would draw an NxM grid of Water and Borders cells, and Ahmed has to mark the maximum number of cells such that:

- He can only mark Water cells.
- Once a cell is marked, all the other cells on the same row or the same column cannot be marked.

Ahmed is a decent programmer, so he decided to code the solution to this problem. However, the game turns out to be harder than what he has thought. Can you help Ahmed determine the maximum number of cells he can mark?

Input

The first line of input contains a single integer T ($1 \leq T \leq 100$), denoting the number of test cases.

The description of the test cases is as follows:

- The first line of each test case contains two integers: N and M ($1 \leq N, M \leq 300$) - dimensions of the board.
- Then, N lines of M characters each are given, representing $grid_{i,j}$ where 'W' denotes a Water cell and 'B' denotes a Border cell.

Output

For each test case, print a single integer denoting the maximum number of cells Ahmed can mark, with respect to the conditions specified.

Example

grid.in	standard output
2 3 3 WWW WWW WWW 3 3 WWW WBB WBB	3 2

Problem F. Magic Mirror

Input file:	mirror.in
Output file:	standard output
Balloon Color:	Green

Salma's favorite two things in the world are: her mirror and her toy bricks. Salma's toy bricks are designed to help children learn the alphabet, so there are some letters written on their faces. Salma likes to play with the bricks in front of her mirror.

When Salma learned the alphabet, she noticed that her mirror was somehow magical. Some bricks with a letter on them can show a different letter in the mirror. Salma enjoyed this magical feature very much, that she invented a game. The game is about trying to make a word T_1 from the bricks in the real world, in which it's reflection in the magical mirror is T_2.

The rules of this game are the following: Salma creates a row of bricks that form the word S_1. This word is shown in the mirror as some word S_2, which may be different from the reflection of S_1 because the mirror is enchanted. The length of S_2, however, remain the same as S_1, which is equal to N.

Then, Salma can repeat the following step. She selects some two bricks i and j and swaps them. The reflected Salma in the mirror does exactly the same with the mirrored bricks, except that she swaps the bricks with positions $N-i+1$ and $N-j+1$.

The goal is to create word T_1 in the real world simultaneously with the word T_2 in the mirror. Salma wonders whether it is possible, and she asks you for help. Write a program which can determine whether the goal can be achieved.

Input

The input file contains four words S_1, S_2, T_1 and T_2, in this order, each on the separate line. All words have the same length N ($1 \le N \le 100$) and consist only of uppercase English letters.

Output

If the goal can be achieved, output "Yes". Otherwise, output "No".

Examples

mirror.in	standard output
KITTEN NETTIK TENKIT TIKNET	Yes
A B A C	No

Problem G. NITD Problems Thieves

Input file:	`thief.in`
Output file:	`standard output`
Balloon Color:	Blue

"Catch the thieves!", said the ACPC director.

The problem set of this contest was stolen, and the the thieves had already escaped when the contest police arrived!

The country where the problem set was stolen can be represented by N cities, numbered from 1 to N, with M two-ways roads varying in length.

Initially, the thieves were at city S and we know all the possible destinations that they may be headed to. We also know they are in a hurry, so they will choose the shortest path to their destination.

We have another important information. On his way to the contest floor, one of the judges reported that he saw the thieves between city A and city B. We are now sure that they used that road between those two cities (but we are not sure if they used it while going from city A to city B or vice versa).

Can you tell the contest police the candidate destinations the thieves may still be headed to, given that they certainly used the road between city A and B?

Input

On the first line one integer : the number of test cases, $(1 \leq T \leq 100)$.

After that, per test case :

- One line with three space-separated integers N, M and K $(2 \leq N \leq 2000, 1 \leq M \leq 50,000$ and $1 \leq K \leq 100)$ - the number of cities, the number of roads between those cities, and the number of possible destinations, respectively.
- One line with three space-separated integers S, A and B $(1 \leq S, A, B \leq N)$: the city the thieves started from and the two cities between which the thieves has traveled, with $(A \neq B)$.
- M lines with three space-separated integers u, v and d $(1 \leq u < v \leq N)$ and $(1 \leq d \leq 1000)$, indicating that there is a bidirectional road between cities u and v of length d.
- K lines with one integer x $(1 \leq x \leq N)$ - possible destinations. All possible destinations are distinct and they are all different from S.

There is at most one road between a pair of cities.

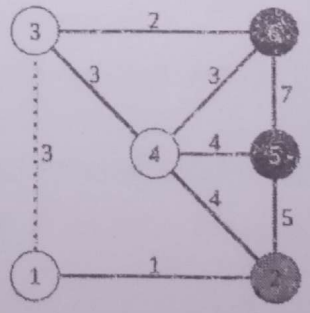
Output

One line per test case with one or more space-separated integers, indicating the destinations that the thieves can still be headed for, in increasing order.

Example

thief.in	standard output
2 5 4 2 1 2 3 1 2 6 2 3 2 3 4 4 3 5 3 5 4 6 9 2 2 3 1 1 2 1 1 3 3 2 4 4 2 5 5 3 4 3 3 6 2 4 5 4 4 6 3 5 6 7 5 6	4 5 6

Note



A visual representation of the second sample. The thieves are travelling from the gray city to one of the two dark cities, and they have been seen crossing the dashed road, so they could be heading to city number 6.

Problem H. Pure Oxygen

Input file:	oxy.in
Output file:	standard output
Balloon Color:	Rose

In a parallel universe, it's the Year 2030, and guess what? Oxygen is no longer free! After making a lot of profit in the last two years, the company "Pure Oxygen" -which is specialized in selling Oxygen- decided to go public (making its shares available in the stock market). Omar, an ambitious graduate, decided to invest in "Pure Oxygen". To make some profit, Omar will buy exactly one stock then sell it.

Given the stock values during N consecutive days, can you tell Omar on which day he should buy a stock and on which one he should sell it, in order to make the maximum possible profit? Or determine if he cannot make any profit.

Please note that Omar cannot sell a stock before he buys it (Surprising huh?!).

A profit is the difference between the price he sold the stock at and the price he bought it for (A difference less than or equal to 0 is not a profit).

Input

The first line contains a single integer N ($1 \leq N \leq 10^3$) - the number of days.

The next line contains N integers, each indicates the stock price X_i ($1 \leq X_i \leq 10^6$) on the i^{th} day ($1 \leq i \leq N$).

Output

If Omar cannot make any profit print "-1" (without quotes).

Else, print 3 separated integers B, S and P, respectively, corresponding to the buying day, the selling day and the profit made.

If there are multiple solutions, print the answer with the smallest couple (B, S).

A couple (C, D) is called smaller than a couple (E, F) if $(C < E)$ or $(C = E$ and $D < F)$.

Examples

oxy.in	standard output
5 4 1 2 3 5	2 5 4
8 8 7 6 5 4 3 2 1	-1

Note

In the first sample, Omar will buy a stock on the 2^{nd} day then sell it on the 5^{th} day, making a profit that is equal to $(5 - 1 = 4)$.

In the second sample, Omar cannot make a profit, so the answer is -1.

Problem I. Happiness Pills

Input file:	`pills.in`
Output file:	`standard output`
Balloon Color:	`Violet`

One day, Helmi woke up craving to solve problems, so he logged into his favorite competitive programming platform in order to start coding.

However, he is faced with a dilemma. There are N problems on the platform. Each problem i will take him t_i amount of time to solve and give him p_i amount of happiness.

There is also a catch. Helmi has 10 special happiness pills, each corresponds to one of the first 10 prime numbers. After solving a problem, Helmi can -if he chooses to- consume one pill and the happiness he receives from solving that problem will be multiplied by the prime that corresponds to that pill.

Once a pill is consumed, it cannot be reused. In order not to let Helmi overdose, he cannot take more than one pill after solving a single problem.

Helmi doesn't have all the time in the world. To be more precise, Helmi has only T amount of time before he stops solving problems.

Can you help Helmi calculate the maximum happiness he can get?

Input

The first line of input contains two integers N and T $(1 \leq N, T \leq 2000)$.

The next N lines contain information of i^{th} problem, describing happiness and time of the i^{th} problem: p_i and t_i, respectively $(1 \leq p_i, t_i \leq 10^9)$.

Output

In a single line, output the maximum possible happiness value.

Example

pills.in	standard output
3 4 1 1 2 1 3 1	152

Note

For the sample test case, Helmi can solve all the problems, so the maximum profit is equal to $1 * 19 + 2 * 23 + 3 * 29 = 152$.

Problem J. Distributing Cookies

Input file:	solve.in
Output file:	standard output
Balloon Color:	White

"Winning is not about how many medals you get-it's about accomplishing goals and just being the best you can be!" - Michelle kwan

The ACPC committee has decided to present cookies to the 3 medalists: gold, silver and bronze (suppose we have only one medalist of each kind).

The committee bought a total number of X cookies. To distinguish the medalists, the bronze medalist will have an amount of cookies that is less than or equal to $\sqrt{X}$. The silver medalist will get strictly more cookies than the bronze medalist, and the gold medalist will get strictly more cookies than the silver one. There should be no cookies left.

Given the number of cookies, how many distinct ways are there to split the cookies between the medalists, satisfying the given constraints? Print this number of ways modulo 1000000007 $(10^9 + 7)$.

Input

The first and only line contains one integer $X (X \leq 10^9)$ - the number of cookies to be distributed.

Output

Print a single integer - the answer to the problem modulo 1000000007 $(10^9 + 7)$.

Examples

solve.in	standard output
5	0
8	2

Note

In the first sample, no cookies distribution meets the constraints.

In the second sample, the 2 possible distributions are: $[1, 2, 5]$ and $[1, 3, 4]$.

Problem K. Median

Input file:	median.in
Output file:	standard output
Balloon Color:	Pink

You have got a string S of lower case English letters and you are given Q queries

There are two types of queries:

In the query of type 0, you will be given an integer i and character **c** and you should change the value of index i in S to character **c**.

For the query of type 1 you will be given 4 integers $L1$, $R1$, $L2$, $R2$ defining two substrings in S, substring $A = S[L1, R1]$ and substring $B = S[L2, R2]$, let string $C = A + B$ (the concatenation of the strings A and B) the answer to this query is the median of string C.

In this problem, the median of a string S of length N is equal to the character in index floor$(N/2)$ (zero-based) after you have sorted S

A substring S[L,R] is a string equals to $S_L S_{L+1} S_{L+2} ... S_{R-1} S_R$ and its length equals to R - L + 1

floor(x) is the largest integer number not greater than x. floor$(5/2) = 2$. floor$(1/2) = 0$. floor$(4/2) = 2$.

Input

The first line contains an integer T $(1 \leq T \leq 10)$, the number of test cases.

The first line of each test case contains the string S $(1 \leq |S| \leq 100)$.

The next line contains an integer Q $(1 \leq Q \leq 100)$, the number of queries.

The next Q lines contain the description of the queries, query of type 0 are given as 0 i **c** $(0 \leq i < |S|)$ and **c** is an lower case English letter

and query of type 1 are given as 1 L_1 R_1 L_2 R_2 $(0 \leq L_1 \leq R_1 < |S|)$,$(0 \leq L_2 \leq R_2 < |S|)$

Output

For each query of type 1, print the median of string C.

Example

median.in	standard output
1 achaagcdf 5 1 0 4 5 6 1 0 3 0 2 0 4 b 1 2 2 3 4 1 2 4 2 4	c c b b

Problem L. Surprise Party!

Input file:	party.in
Output file:	standard output
Balloon Color:	Black

On this specific day, 20 years ago, Lara's parents got married. Two decades of caring for each other, loving one another and most importantly: sharing what's good and what's bad. To surprise them and to celebrate their anniversary, Lara decided to throw a party. She contacted a brilliant event planner to help her with the party preparations. The planner is very busy, so he told Lara when to expect him and for how long it would take him to finish the decorations.

In order for Lara's parents to be surprised, the parents must not be at home when the event planner is there. If they are home at the same moment the planner leaves, they will still be surprised.

Luckily, the parents are invited to an event at the city hall, and will not be back until the event finishes. They will take the new car Lara's father just bought.

Consider the city where Lara lives a 2-dimensional plane, and that there is a straight road between Lara's house and the city hall.

Given the location of the house, the location of the event, the new car speed, the start time of the event, the start time of the preparations, the duration of the event and the duration of the preparations, can you help Lara determine whether her parents will be surprised?

It is guaranteed that the parents will leave the house before the event planner arrives.

Input

The first line contains two integers, X_{home} and Y_{home} ($-10^4 \leq X_{home}, Y_{home} \leq 10^4$) - the coordinates of Lara's home.

The second line contains two integers, X_{event} and Y_{event} ($-10^4 \leq X_{event}, Y_{event} \leq 10^4$) - the coordinates of the location of the event.

The third line contains one integer, S ($1 \leq S \leq 500$) - the parents car speed/minute.

The fourth line contains two integer, $Start_{event}$ and $Start_{prep}$ ($0 \leq Start_{event}, Start_{prep} \leq 10^3$) - the starting minute of the event and the starting minute of the preparations.

The last line contains two integers, $Duration_{event}$ and $Duration_{prep}$ ($1 \leq Duration_{event}, Duration_{prep} \leq 500$) - the Duration of the event and the Duration of the preparations.

It's guaranteed that the location of the house and the location of the event are not the same.

Output

Print a single line containing "YES" (without quotes) if Lara can surprise her parents, or "NO" (without quotes) otherwise.

Examples

party.in	standard output
0 0 10 5 12 125 225 400 120	YES
0 0 10 5 12 125 225 50 180	NO
0 0 0 25 1 125 225 255 180	YES

Note

In the third sample test, the preparations finish at minute 405 and the parents arrive home at minute 405 so Lara will be able to surprise her parents.

NB : Parents arrival time is always rounded up.

Problem M. Numbers

Input file:	numbers.in
Output file:	standard output
Balloon Color:	Cyan

Mike has two integers X and Y and he wants to make the integer X equal to the integer Y using the minimum numbers of operations possible.

He can choose any of the following operations and apply it to the number X any -possibly zero- number of times:

- **Operation 1:** replace X with $X + 3$.
- **Operation 2:** replace X with $X + 2$.
- **Operation 3:** replace X with $X + 1$.

Can you help Mike find the the minimum numbers of operations needed to make X equal to Y?

Input

The first line of the input contains an integer T $(1 \leq T \leq 100)$ - the number of test cases.

Each test case consists of one line containing two integers X and Y $(1 \leq X \leq Y \leq 100)$.

Output

For each test case, print in a single line: the answer to this problem.

Example

numbers.in	standard output
4 5 5 2 6 3 7 1 10	0 2 2 3