Problem A – Dezfahani

Mosjava was born in Dezfoul, so his has Dezfouli accent. Also, he has been at Isfahan for 4 years. Now he speak partly Dezfouli and partly Isfahani. The Question is how he pronounce a Persian sentence.
There are some rules he obey in speaking in each of Dezfouli and Isfahani. (Dezfouli and Isfahani are more complicated accent and for the ease of question some small rule applied over all type of word)

- In Dezfouli, for imperative such as “begoo”, “be” omit from verb and the transformed form is “goo”.
- In Dezfouli, if the word started with “ab” this too character transform to “O”.
- In Isfahani, if a single ‘a’ appear in a word it will pronounce ‘e’.

A word pronounce could pronounce Dezfouli, Isfahani or without accent. With higher Dezfouli priority.
Given some sentences and your task is to rewrite them such as Mosjava pronounce them.

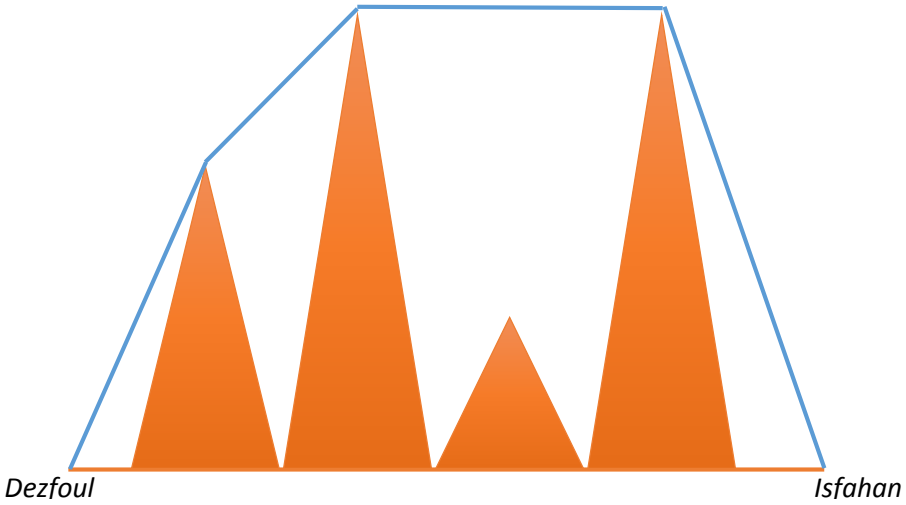
Input:
In the first line of input there is T, number of testcases.
In the next T line there is a sentence containing some space separated word.
It is guaranteed that every character is lowercase.

Output:
For each output print the sentence such as Mosjava pronounce.

Sample Input	Sample Output
3 begoo chi mikhay? ab mikhay? nemigi?	goo chi mikhey? O mikhey? nemigi?

Problem B – Cabling

Mosjava misses his best friends at Isfahan and because the internet speed is slow and he love his friends, he wants to make a connection form Dezfoul to Isfahan by a high speed cable. In the way from Dezfoul to Isfahan there is a mountain the cable should cross above it. Help him to minimize the cable length.
For each mountain the cable the post is on the top of it, which cable should make contact with it if needed.
An example shown if figure below.



Dezfoul is at location 0, every N mountaintop is at 1 to N and Isfahan is at N+1. The altitudes of Dezfoul and Isfahan are 0.

Input:

In the first line of input there is T, number of test-cases.
Each test case started with ($1 \leq n \leq 1000$), Number of mountain.
Then a line containing N space-separated integers, $a_1, a_2, \dots, a_n$ representing the altitudes of mountain.
$0 \leq a_1 \leq a_2 \leq \cdots \leq a_n \leq 1000000$

Output:

For each test-case, print minimum length of cable with 7 digit after decimal point.

Sample Input	Sample Output
2 4 3 4 1 4 5 0 0 4 0 0	10.6995968 10.0000000

Problem C- Soo, The Gamer

Soo decides to play a game with Nahaal. Initially, they place some random digits (0-1…9) one after another to make a long string of digits. Then, each player choose an arbitrary number (***a*** and ***b***) less than 10^8 and start the game. The game is played with the following rules:

1. Soo is the first player (round 1);
2. During each round the player who is on her turn, will cut the string of digits into two nonempty parts based on the round number, r, as index. For example, string 1234 on round 2 is splitting to numbers 12 and 34.
3. If the first (left) part is divisible by a, and the second (right) part is divisible by b, the player wins! Note that both parts should be *positive* integers that have no leading zeros. Otherwise, they go to round r+1 and swap the turn.

Your task is to write a program to determine which player can win the game at first.

Input

In the first line of input there is T, number of test-cases.
Each test case, start with a line containing the initial string of digits, "S", without leading zeroes. It's guaranteed that $1 \le len(S) \le 10^6$ .The next line, contains a pair of space-separated positive integers a, b $(1 \le a, b \le 10^8)$.

Output

For each test case, in the first line print the name of the winner,"Soo" or "Nahaal" (without the quotes), if there is one! Next, print the left and right parts after the successful cut, each in a single line. These two parts, being concatenated, must be exactly identical to the initial string. The left part must be divisible by a, and the right part must be divisible by b. The two parts must be positive integers having no leading zeroes. If there is no winner, print in a single line "DRAW" (without the quotes).

Sample Input	Sample Output
3 302 3 2 23 2 3 23 2 2	Nahaal 30 2 Soo 2 3 DRAW

Problem D - To drop out or not to drop out!

Shahin's studying at a university that has many buildings and they're quite far from each other. At least Shahin thinks so. There are a number of roads between some buildings in a way that you can travel between any two buildings directly or indirectly and you can only travel between buildings via these roads (no bus, no car, walk only! And nobody knows for sure how many buildings and roads there are).

So Shahin's having bad days at university and to make things even worse he recently received an anonymous email that says university has B buildings and R roads. This email also contains shortest distance between each university building. The numbers are so big he decides that's it, he's tired of walkings so much and he should drop out of this tiresome university!

Since this email could be a prank by his friends he decides to verify these numbers and see if they can really be shortest distance between university buildings (his friends aren't cruel so if this email is a prank the numbers can't possibly be shortest distance between B buildings via R roads).

As the cliché goes this task is brought to you and you're the only one in the world capable of solving it.

Input:

In the first line of input there is T, number of test-cases.
Each test case starts with a line containing $B \leq 200$ and R.
Then B_1 line follows describing distances between buildings. The i^{th} line contains B_i numbers and the j^{th} number in i^{th} line is the distance between buildings i and i+j.

Output:

For each test case output a single line. “YES” if the numbers in email are valid or “NO” if email is a prank.

Sample Input	Sample Output
2 3 3 1 2 2 3 2 1 2 2	YES NO

Problem E - Good fellas

Amirhosein and his gang, the HerfeigaryGang want to steal all homes in the city!

People in this (including gang members) city has a gun. They can produce bullets for their guns, and producing each bullet takes a constant amount of time which is might be vary among different persons. We define the *production rate* as the number of bullets each person can produce in an hour. Note that each person has an initial number of bullets. The people start producing bullets as HerfeigaryGang decides to start it's operation, which we call this time as hour 0. So a person with n initial bullet, and the production rate p, will have $n + p$ bullets after the first hour, and $n + i \times p$ bullets at the hour n (time is started from zero).

The HerfeigaryGang principle is so that each home is stolen by one gang member. In addition, if a gang member chooses a home to steal, he will not go further and steal another home (whether he had a successful job or not!). Note that the gang member can wait some hours and produce some extra bullets for himself before starting his job. During this time, the target will produce bullets too!

The HerfeigaryGang, and other people are very logical and hates blood! So when a gang member arrives a home, they count their bullets. If the gang member has more or at least equal number of bullets, he can finish his job! Otherwise, he will be arrested! So, the job (successful or unsuccessful) will be finished just as the gang member arrives his target.

It is necessary to mention that for stealing a home, a member of the gang needs a time to arrive there, and during this period, he cannot produce bullets, but the home owner can and will do it!

As an example, Amirhosein as a HerfeigaryGang member (Although he is the leader) has two initial bullets and his production rate is three. He is invading a home with two bullets as initial and production rate two. The time required to arrive to the target is two hours. If he decides to leave after first hour, he will leave his base with five bullets. When he reach the target, which is hour 3, he will face a person with eight bullets and sadly, he will lose!

Amirhosein decided to write a program to check his chance to steal all the homes! You are hired to help him and write a program to find the shortest possible time (in hours) in which every home is stolen!

Input

There are multiple test cases in the input. The first line of each test case contains two numbers G and H which presents the number of HerfeigaryGang members and homes respectively $(1 \le G,H \le 250)$. The next line of the test case contains G pair of non-negative integers $n_1\ p_1\ n_2\ p_2 \ldots n_D\ p_D$. The number n_i is the initial number of bullets of i^{th} HerfeigaryGang member and p_i is his production rate. The third line contains H pair of non-negative integers which specify the initial number of bullets and the production rate of other people bullets. Third line is followed by G lines each containing H positive integers. The j^{th} number on the i^{th} line shows how many hours it takes a gang member to arrive to the j^{th} home. The last line of the input contains two zero numbers. Initial bullets and the production rates are between 0 and 50000.

Output

For each test case output a single integer which shows the minimum time needed to steal all homes. If there is no way so that HerfeigaryGang steal all the homes, the output should be `IMPOSSIBLE`.

Sample Input	Sample Output
2 1 2 3 0 3 2 2 2 2 0 0	6

Problem F- Warlord

There is war, a Multi-Party war! There are several individuals, n, and some parties. Each individual has joined a party. Each party is going to establish a territory. A territory is a circle area that all individual inside the territory are in the same party. Note that the borders of the territory are evaluated as inside it. A territory have to meet an extra condition: There should be at least two scout on the territory. A scout is an individual which positioned on the border of the territory. You are going to calculate the maximum number of territories that can be established satisfying the above conditions.

Input:

There are several test cases in the input. Each test case start with the number of individuals, *n (1≤n≤100).* The input followed by n lines with the format T_i X_i Y_i so that T_i is the party name and X_i and Y_i are the coordination of the i^{th} individual. Each party name is a string of at most 20 characters from small English alphabet. The coordination are integer with $1 \le X_i Y_i \le 1{,}000{,}000$. The test case with n as 0, means the end of the output.

Output:

For each test case, print the maximum number of territories that can be established.

Sample Input	Sample Output
4 west 1 1 pars 1 2 pars 3 2 east 3 3 0	1

Problem G – Nightmare

Mosjava stuck at a nightmare. Every night when fall asleep a similar nightmare comes, in that nightmare he first is in Dezfoul then the city changes to Isfahan, the city alternatively change at a period of *p*. He has too many good and bad memory in both. If he goes to a place with bad memory he will wake up immediately and his day will be ruined. The only way he can wake up with full energy is to go to a specific place that he has the best memory there.

Given map of Dezfoul and Isfahan with place of bad and the best memory and start, it is guaranteed that there is only one best memory place and starting location always is in Dezfoul. Going from a place to another take 1 unit of time. Each city is a $n \times n$ square.

There is an example shown below with period of 3. B is the best memory place, X means bad memory place and S is the starting location. The shortest time to reach to best place is 6.

B	X	X
X	X	
S		

Dezfoul

X	X	
X	X	X

Isfahan

Help Mosjava get up as early as possible with full energy.

Input:

In the first line of input there is T, number of test-cases.
Each test case starts with two integer n ($1 \leq n \leq 50$) and p ($1 \leq p \leq 50$). Then comes 2n+1 lines in follow, each having n character representing the map of cities except n+1th line. The first map belongs to Dezfoul and second is Isfahan.
'B' : Best memory place 'X' : Bad memory place 'S' : Start location '.' : Ordinary location
Output:

For each test-case, print the earliest possible time Mosjava could wake up with full energy. If there is no way print "NO ANSWER" without quotes.

Sample Input	Sample Output
1 3 3 BXX XX. S.. ... XX. XXX	6

Problem H - Candy Crush

The King.com Ltd. best known for developing the Candy Crush game has decided to add an experimental interesting feature to Candy Crush in order to test its effectiveness to incentivize people to spend much more time playing the game. With this feature, a nice badge will be given to the player after winning each level, even those levels the player has already won. These badges fall under N different categories. After winning a level, the player will win a badge randomly from one of these categories. Once a player win at least one single badge from all categories, a special funny level is unlocked and the player will be rewarded a bunch of Lollipops and Color Bombs by winning this special level.

Mr. Sisaman who is a fan of Candy Crush wants to win the reward because he has got trapped in a very hard level that can't be passed without using the Lollipops. But these days he is over busy working on a project so he has not much time to play Candy Crush. On the other hand, this experimental feature may be canceled after a while and he loses the chance of winning the reward.

After one day, Mr. Joachim - the blog moderator of Candy Crush - published a post on Candy Crush blog introducing this new feature. It was announced that a badge of category j, will appear with probability p_j after winning a level. This information was meaningful for Mr. Sisaman because now he can find the number of levels he has to win to get the reward. But if he had time to calculate the expected number of levels, he would just play instead of doing calculation. So he turned to you to help him.

Input

First line of each test case starts with N, the number of badge categories. (N <= 10) The next line consists of N real numbers p_1 to p_N, the probability of winning a badge of category 1 to N, after winning a level. A value of N = 0 indicates end of input.

Output

For each test case, output a real number - the expected number of levels Mr. Sisaman needs to win to get the reward, rounded to four digits after decimal point.

Sample Input	Sample Output
2 0.5 0.5 3 0.2 0.3 0.5 0	3.0000 6.6548