Problem A. High school mathematics

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Gold`

In number theory, two integers a and b are said to be relatively prime or coprime if the only positive integer that divides both of them is 1. Consequently, any prime number that divides one does not divide the other. This is equivalent to their greatest common divisor being 1

Given a number n we want to count the number of integers i ($1 \leq i \leq n$) that are co-prime with n.

Input

The input consists of multiple test cases, the first line of the input file contains an integer $1 \leq T \leq 10$ denoting the number of them.

Each test case consists of a single integer n ($1 \leq n \leq 10^9$) described above.

Output

For each test case output one line containing a single integer : the answer to the problem.

Example

standard input	standard output
3 2 10 100	1 4 40

Problem B. Rotten Berries

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Yellow`

Safae is trying to control the world using raspberries. She wants to turn everyone into a slave.

She is actually storing her raspberries in the refrigerator, You can think of Safae's refrigerator as an n by m Two-Dimensional grid.

Each cell of the grid contains either:

1. an empty cell represented by a dot ('.').
2. a fresh raspberry represented by the letter 'o'.
3. a rotten raspberry represented by the letter 'x'.

As Safae was busy preparing for the world control plan, she is extremely tired and she will take d days vacation. But since some of the raspberries were rotten, they will damage some of the fresh raspberries. In fact, at the end of each day, each rotten raspberry will damage the adjacent fresh raspberries.

Your task is to determine how many fresh raspberries are in Safae's refrigerator after she returns from her vacation (after d days have passed).

Please note that rottenness cannot travel through empty cells, that is a rotten raspberry cannot affect an adjacent empty cell.

Input

the first line of the input consists of n and m ($1 \leq n, m \leq 100$), the number of rows and columns in the refrigerator respectively.

n lines follow where each contains m characters representing the n-th row of the refrigerator.

the next line of the input contains one single integer ($1 \leq d \leq 1000$) representing the number of days Safae took as a vacation.

Output

Output one single Integer the number of remaining fresh raspberries in Safae's Refrigerator.

Examples

standard input	standard output
3 3 ooo oxo ooo 1	4
3 3 ooo oxo ooo 2	0

Problem C. Unique SubString

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Purple`

While Safae is working on controlling the world using her raspberries, her sister Ibtissam decided to pay her a visit. Ibtisam has a high level of curiosity which pushed Safae to secure the refrigerator where she keeps the raspberries using a password.

Ibtissam knows her sister's weird password choices:

- Safae does not use a letter more than once in all her passwords.
- She also uses lexicologically small passwords

Ibtissam does not have the intention of messing with her sister's work, she just wants to have a look at the content of the refrigerator.

Your task is to help Ibtissam find the password of her sister's refrigerator by removing duplicate letters from a given string to obtain Safae's password. You have to make sure the resulting string is the lexicographically smallest one.

Note that you are not allowed to change the characters order in the given string and all the characters appearing int he given string must appear in the password exactly once.

Input

The Input consists of a single String s of length |s| where $1 \leq |s| \leq 10^5$. The String s consists of only lower case characters ('a' to 'z').

Output

Output a single line contains the answer to the problem.

Examples

standard input	standard output
acba	acb
bcacbac	abc

Note

In the first sample, you cannot remove the 2nd letter 'c' since it appears only once.

Problem D. Last Digit!

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Red`

For any given number n output the last digit of $n!$ (n factorial).

Input

The first line of the input contains an integer t denoting the number of test cases. t lines follows each contains an integer ($0 \leq n \leq 10^9$).

Output

For each test case output the last digit of n factorial.

Example

standard input	standard output
2 1 10	1 0

Problem E. Tree Puzzle

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Orange`

Given a tree rooted at node 1, find the sum of nodes' values in even levels. The level of node 1 is 1, the level of nodes directly linked to node 1 is 2, and so on...

Input

First line contains $2 \leq N \leq 10^5$, the number of nodes in the tree. Following a line containing N integers, where the i-th integer is the value of the i-th node. Following $N-1$ lines describing edges in the tree. Each line contains two integers $1 \leq u, v \leq N$, $u \neq v$, which means that node u is linked to node v by an edge in the tree.

Output

Print a single number, the sum of nodes that are on even level.

Examples

standard input	standard output
3 1 2 3 1 2 1 3	5
7 1 2 3 4 5 6 7 2 1 1 3 4 1 5 3 5 6 7 5	22

Note

- the root node is on level 1 - the root node is node 1

Problem F. Stable Zeroing

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`White`

Azuz, the scientific committee chair (has been doing nothing scientific anyway), started to learn how to code lately. He enjoyed the idea behind stable sorting and decided to make an interesting "stable zeroing"problem.

The idea behind stable zeroing is easy enough, you just need to move all the zeros to the end of the array, while leaving the non-zero elements in the same order they were before.

Your task is, giving an array, stable zero it!

Input

The first line of the array contains an integer $1 \leq n \leq 10^5$ denoting the size of the array. The second line of the input contains n integers, the elements of the array (the elements can be very large up to 10^{18} and can be negative as well).

Output

Output the resulting array after the transformation separated by 2 spaces.

Examples

standard input	standard output
3 1 0 2	1 2 0
5 1 0 2 0 3	1 2 3 0 0

Note

The output should not have any space at the beginning or the end of the array.

Problem G. Azuz's Anagram

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Pink`

Our savior, MACM scientific committee head, astronaut, coder, single (4ever alone), french-man, jack of all trades master of none, leader, the one and only Azuz, recently discovered anagrams! Now he's gonna bless us with a hard problem he never had the chance (or the skills) to solve.

Given a pair words, print "Awesome anagram"if the first word is an anagram of the second, or "Azuz is not my leader"otherwise.

An anagram of a word according to Azuz, is another word where the characters' order is a permutation of the original word's characters, except for the first and last character which will stay in their respective positions.

Input

First line contains the number $N \leq 100$ of pair of words to check. Following N lines, each line contains two words separated by one space. Words contains only lowercase alphabetic characters, and are at most 30 character long.

Output

Print N lines, where each line contains the answer to Azuz's question for each pair.

Example

standard input	standard output
4 a a ab ab abd acd abcd acbd	Awesome anagram Awesome anagram Azuz is not my leader Awesome anagram

Problem H. Houda and Weird Auction

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes
Balloon Color:	`Cyan`

Houda won the lottery recently and decided to travel around the world. She reached a city called *Logtown* where they held a lot of somewhat weird auctions in their festivals.

The idea behind their auctions is that there's a big box where you place your bet, and your bet basically contains your name and a value you are betting with. At the very end of the day, the organizers open the box and then give a reward to the person with the highest bet among all people who placed their bets in the box, and this reward is equivalent to the difference between the maximum bet (the winner's) and the minimum bet placed in the box.

«««< .mine The picked two papers (maximum paper bet, and minimum paper bet) are pulled from the box and all the remaining get returned to it, and the auction continues the same way the next day (using the same box), for a total duration of B days . ||||||| .r1 The picked two papers (maximum paper bet, and minimum paper bet) are pulled from the box and all the remaining get returned to it, and the auction continues the same way the next day, for a total duration of B days . ======= The picked bets (maximum bet and minimum bet) are pulled out completely from the box while all the other remaining bets stays in the box where they will participate in the next auction to come the following day. These auctions lasts for a total duration of B days. »»»> .r12

«««< .mine The papers are given to contestants by a machine that assigns values randomly, so that you don't put whatever number you like on your paper to keep the luck factor and the auction fun and unpredictable . ||||||| .r1 The papers are given to contestants by a machine that assigns values randomly, so that you don't put whatever number you like on your paper . ======= The only problem why people don't participate a lot these kinda auctions, is that the bets' values are randomly assigned to the gamblers randomly by a machine placed next to the box in an encrypted way, only known to the organizers at the moment of deciding the winner. »»»> .r12

Houda being clever as always, wanted to find out her chances of getting a good investment in this auctions. She decided then to play it safe, gather some data by counting the total amount of money awarded in total across all auctions in one festival.

For instance, if the auction lasted three days, and the winner of the first day won 50 Berrys, while the winner of the second day won 30 Berrys and the winner of the third day won 0 Berry (The maximum can be equal to the minimum, it's random but it's not guaranteed to have distinct values), then the total reward of all auctions will be 80 Berrys.

Can you help Houda make more money? *(PS: Houda is very rich and now you know why :))*

Input

The first line of input is an integer $1 \leq T \leq 100$ denoting the number of festivals.

The next lines contains the description of the T festivals.

For each festival, the first lines is an integer $1 \leq B \leq 10^3$ denoting the number of days in the festival (i.e. the number of auctions).

Then B lines follows, each lines starts with an integer $1 \leq K \leq 100$ denoting number of bets on the i-th day, follwed by K integers $0 \leq bet_j \leq 10^9$ denoting j-th bet value on that day. ($2 \leq K$ for the first day to have at least two bets, and then it's guaranteed for the following days that the box will always have at least 2 bets placed inside)

Output

For each festival, print one single number denoting the total reward of that festival (sum of rewards of all auctions in that festival).

Example

standard input	standard output
2 3 2 120 40 3 40 20 0 1 20 2 2 6 3 4 1 2 10 20	120 22

Problem I. Oola and the Rabbits

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes
Balloon Color:	`Black`

Oola the scientist is conducting social experiments on rabbits (because she does not like cats). Recently, she taught her rabbits the power of friendship, because she thinks that's important. Her rabbits talk between each other only if they are friends.

Today, she want to know how fast rumours are spread in her rabbit community. More specifically, if rabbit R starts a rumour, how much time will it take for it to reach everyone? When rabbit R starts a rumour, it will send it to all its friends, then likewise, the ones who received the rumour will spread it to their friends until everyone know about it.

If it takes 1 unit of time for a rabbit to send a message to its friends, Oola wonders how much time will it take, in the worst case, for a rumour to spread. She is very busy now, because she traveling to London, so she entrusts you dear reader to solve it for her.

Input

Input starts with two numbers N, and M denoting the number of rabbits, and the number of friendships respectively $1 \leq N \leq 50$ and $N - 1 \leq M \leq 2500$. Then M lines follow, each containing two numbers a, and b meaning that $rabbit_a$ and $rabbit_b$ are friends. Rabbit ids are between 0 and $N - 1$.

Output

For each test case output the worst case a rumour can be spread.

Examples

standard input	standard output
2 1 1 0	1
3 2 0 1 1 2	2

Note

In the first test case, two rabbits that are friends, it will take one unit of time for them to talk.

In the second test case, rabbit 0 is friend with rabbit 1, and rabbit 1 is friend with rabbit 3. If rumour starts from rabbit 2, then it will take two units of time to reach the first rabbit.

Note that rabbit friendship is mutual and that the rabbit community is always connected.

Problem J. Houda Playing Pocker

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes
Balloon Color:	`Green`

Houda heard of a game called *Poker*, as you might know, it's a game that's widely played around the world, and good players actually win huge amounts of money in international tournaments. Houda got excited and wanted to participate as well, but as she is a computer science student not a gambler. She gathered some data about last year's tournaments bets, and she wanted to find patterns in betting that might help her win.

A bet is described but as a positive value if it's a *win* or a negative value if it's a *loss*, the problem that faces Houda now is to find the longest continuous winning streak, that means the one that generates highest amount of money, out of a series of N given bets .

For example given the series $1, 2, -1, 5, -12$ the longest continuous winning streak is $1, 2, -1, 5$, which is 7 in total. Your task is to help Houda find the value of the longest continuous winning streak. If she can't win any money just print *"better luck next year"* (without the quotes).

Input

First line contains an integer $1 \leq T \leq 20$ number of test cases

Each test case starts with a number $1 \leq N \leq 100000$ of bets, followed by a line containing N numbers $-1000 \leq bet_i \leq 1000$ the bets that were made .

Output

Output a single value, the value of the longest continuous winning streak, or *"better luck next year"* (without the quotes) if Houda can't win any money.

Example

standard input	standard output
2 6 1 2 -2 8 -4 8 3 -1 -2 -3	13 better luck next year