B. Forklift

This year witnessed the flawless introduction of the OV-chipcard. To reduce the number of fare dodgers, but also to accomodate the elderly and speed up the boarding process, passengers are required to travel in boxes. These are more easily accessible than a train and can accomodate people in wheelchairs, or multiple children, in one box!

Joe drives a forklift truck in the train's compartments to get everyone in the right place, a responsible, well-paid job. All day long he is transporting boxes with passengers from and to the train, leaving them wherever he can. Before departure he has to tidy up and make sure all stacks are equally high, otherwise the train might derail. Since the train has to leave on time Joe wants to use the shortest route along the stacks that will enable him to equalize them all.

The train has only one long line of equally-spaced stacks (there is half a meter between stacks), Joe is initially in front of the first stack. Each stack has zero or more equally dimensioned boxes (each box is $1.5 \times 1.5 \times 1.5$ meters, allowing for people and objects of upto 2.60cm in length). If he is in front of the middle of a stack he can turn towards it and load or unload as many boxes as he likes. Can you determine how short the shortest route is that Joe can take to make sure that all stacks are equally high (he does not necessarily need to return to the beginning).

Input

On the first line of the input is a positive integer, the number of test cases. Then for each test case:

- A line with a single positive integer $n < 10^6$, the number of stacks.
- A line with n non-negative integers $b_i < 10^9$, the number of boxes in the ith stack. The total number of boxes is divisible by n, and is at most 10^9.

Output

For each test case:

- One line containing a single integer, the length of the shortest route that Joe can take to make sure that all stacks are equally high.

Example

Input	Output
3 3 3 0 0 3 0 0 3 5 0 4 0 11 0	4 8 16

D. Downhill

This year witnessed the flawless introduction of the OV-chipcard. Most commonly the OV-chipcard is used as a toy (4 years and older) or as a bookmark, in some cases it is even used to open locked doors. This is why Paul, a traveling salesman from New York, just knew that he had to get his hands on as much of these versatile tools as possible. Back home he visits a number of houses each day to sell his merchandise.

The streets in Manhattan, where Paul works, form a regular grid. There are numbered streets running east-west and numbered avenues running north-south. Paul has taken great care to plan an efficient route through the city, visiting all the houses of potential clients.

This Monday morning disaster struck: his car broke down. It still runs, but just barely. He can go no faster than 20 miles per hour, and only downhill.

Fortunately for Paul Manhattan was build on a hill and he lives at the highest point, at the intersection of 1st street and 1st avenue. So he is still able to drive south to 2nd street, 3rd street, etc.; or east to 2nd avenue, 3rd avenue, etc.. His regular route is no longer an option, since then he would also have to drive uphill. Paul would still like to visit as many houses as possible, so he can earn enough money to fix his car.

Input

On the first line of the input is a positive integer, the number of test cases. Then for each test case:

- A line with a single natural number [licht]$n < 10^4$[¬licht]$n < 10^6$[all], the number of houses Paul could visit.
- n lines, each containing two positive integers $s_i, a_i < 10^9$, the street and avenue number of the intersections where a house is located. All houses are located at different intersections.

Output

For each test case:

- One line containing a single integer, the maximal number of houses Paul can visit.

Example

Input	Output
2 9 1 2 1 3 1 4 2 2 2 3 2 4 3 2 3 3 3 4 6 3 4 4 2 2 1 6 5 1 6 5 3	5 4

E. Dining Philosophers

This year witnessed the flawless introduction of the OV-chipcard. So much so in fact, that word of this has even traveled beyond this life and into the next.

The first circle of hell is reserved for the unbaptised and the virtuous pagans. Among them are most of history's famous philosophers.

Such is it that we find Immanuel Kant, Socrates, John Locke, René Descartes and Søren Kierkegaard deciding to hold a dinner party, to ponder about these new troublesome developments in the Netherlands. They have seated themselves at a round table. In front of each philosopher is a dinner plate, between each pair of plates is a fork. In the center of the table is a large tray of chicken drumsticks, freshly roasted above the fires of hell.

These philosophers are among the most civilised men in history, but even the most decent folks soon degrade to a band of complete idiots at the sight of chicken drumsticks. To prevent this horrible outcome the philosophers have decided on a strict protocol for the dinner. Before making any move on the delicious food a philosopher must hold both of the forks next to his plate. Only then may he pick up and eat exactly one drumstick from the tray. After eating this drumstick, which takes approximately 1 minute, the philosopher is to put down both forks and has the opportunity to share some deep insight with the other participants, which takes only 10 seconds. After that he may try to lift his forks again to resume eating.

Upon agreeing on the protocols each of the philosophers immediately picks up the fork at his right hand side, hoping to get the opportunity to impress the others with his wisdom (not to mention being able to savour the delicious meat he has been staring at for some time now). The philosophers quickly realise the gravity of their dilemma: their protocol is clearly flawed, yet none of them feels compelled to give up their chance at the meat.

Kant decides that it is his categorical imperative to do something about this situation. He puts down the fork in his right hand, to give someone else a chance to eat. Socrates, who sits next to kant, immediatly takes advantage of this oportunity and picks up the fork. Since he now holds two forks he takes a single drumstick and eats it.

Input

On the first line of the input is a positive integer, the number of test cases. Then for each test case:

- A line with a single positive integer i, $i < 10^6$, the number of drumsticks on the table.

Output

For each test case:

- One line containing a single integer, the number of drumsticks Immanuel Kant eats.

Example

Input	Output
2 13 65	2 13

F. Settle the Bill

This year witnessed the flawless introduction of the OV-chipcard. Unfortunately the new OV-chipcard does not allow for multiple people to travel on one card. This is bad news for the Computer Science department as they frequently travel together, sharing the costs. As they have not settled the last few travel bills yet (assuming that in the long run it would cancel out anyway) they agree to settle them now, once and for all.

As a certain kind of laziness comes natural to every good computer scientist: they naturally want to minimize the number of transactions. After a few all-nighters Professor Bakker has figured out that $n-1$ is an upper bound for the number of transactions needed to settle debts between n persons. His general theory of settlements is based on the assumption that the number of transactions over x days is described by $t(x) = \big(x^{(n-1)} - 1\big)/\big(x-1\big)$. In the optimal case where all transactions are settled in a single day this gives $\lim_{x\to 1}\big(x^{(n-1)} - 1\big)/\big(x-1\big) = n-1$.

Some people think they can do better though. Can they?

Input

On the first line of the input is a positive integer, the number of test cases. Then for each test case:

- A line containing two positive integers $n < 20$ and $m < 400$, the number of people and the number of debts respectively.
- m lines containing three integers $0 \le f_i, t_i < n$ and $a_i < 10^7$, the zero-based index of the person who owes money, the zero-based index of the person to whom he owes money, and the amount of money owed in Euros.

Output

For each test case:

- One line containing `tight` if Professor Bakker's bound is tight (exactly $n-1$ transactions are needed) in this case, or `loose` if the bound is not tight (in this case).

Example

Input	Output
2 3 2 0 1 20 1 2 10 4 2 0 1 20 2 3 20	tight loose