Problem 1. Area Covered by Rectangles

(Time Limit: 2 seconds)

Problem Description

You are given some rectangles and asked to compute the area covered by these rectangles. The edges of all rectangles are parallel to X-axis or Y-axis.

Input Format

The first line of the input is an integer n ($0 < n < 10$) which is the number of test cases. Each case starts by an integer m in one line, which is the number of rectangles in this test case. The following m lines are the data of the rectangles, one line for one rectangle. Each rectangle is given by 4 integers

$x_1\ y_1\ x_2\ y_2$

which means the range of the X-coordinate (and the Y-coordinate, respectively) of the rectangle is between x_1 and x_2 (and between y_1 and y_2, respectively). We assume $m \leq 3000$ and all coordinates are nonnegative and at most 30000.

Output Format

Output the covered area of each test case in one line.

Example

Sample Input:	Sample Output:
2 2 0 0 5 5 0 0 10 1 1 0 1000 1000 0	30 1000000

Problem 2. Arithmetic Puzzle

(Time Limit: 3 seconds)

Problem Description

Arithmetic puzzle is a popular game for testing the player's arithmetic skill. This time, we will introduce a mathematical expression puzzle. The puzzle gives *n* numbers, 2 operators ("+" and "–"), and one equal sign "=". The player must make a mathematical expression using all of the numbers, operators, and equal sign in the sequence. Each number and equal sign in the sequence must be used exactly once, but each operator may be used zero to many times. For example, given four numbers 1, 2, 3, and 4, 1 + 4 – 3 = 2, 1 + 4 = 2 + 3, and 4 – 3 = 2 – 1 are three legal expressions. Please write a program to check whether there exists any legal expression composed by the given numbers, equal sign, and operators.

Technical Specification

- All the given numbers are integers greater than 0 and the sum of integers for each test case is to most 250000.

Input Format

The first line is an integer which indicates the number of test cases. For each test case, the first line is an integer *n*, $2 \le n \le 20$, which indicates the number of integers. The second line consists of *n* integers separated by a space.

Output Format

For each test case, if there exists any legal expression, then output "YES", otherwise output "NO" in a line.

Example

Sample Input:	**Sample Output:**
2 4 1 2 3 4 3	YES NO

1 7 21	

Problem 3. Fighting!

(Time Limit: 3 seconds)

Problem Description

There is a warrior with 100 HP (Health Point), he needs to kill a monster whose HP is 777. The warrior has a 7*7 board and a dice within the board, which allows the warrior to cast a special magic that decreases the HP of the monster, or himself, depending on how and where a dice is landed.

Cell (1,1) is the SW corner of the board, and cell (7,7) is the NE corner of the board. At first, a normal dice is placed at (1,1) with status (n1,n2,n3), where a normal dice is one such that the sum of the numbers on any side and its opposite side is always 7. The number n1 indicates the number facing up initially, so the number facing down is 7-n1. The number n2 indicates the number facing N, and n3 indicates the number facing E. The dice can roll in its four direction, so a dice at cell (x,y) can roll to (x+1,y), (x-1,y), (x,y+1), (x,y-1), but the dice cannot get out of the border. The orientation of the dice will be changed according to how it is rolled. For instance, if it rolls from (x,y) to (x,y-1), then the numbers facing E and W do not change, the number of the down side becomes facing N, the number facing N becomes facing up, the number of up side becomes facing S, and the number facing S becomes facing down.

Cells are classified into two groups, positive or negative. When the dice is at a positive cell, then we can give some damage to the monster. The amount of damage is the number facing down when the dice lands on that cell. Unfortunately, when the dice is at a negative cell, the warrior will get damage from the monster. The amount of damage is also the number facing down when the dice lands on that cell.

Whoever's HP becomes 0 will be killed, and the game is over. The warrior can control the movement of the dice, and wants to know whether he can kill the monster or not. That is, is there a way to decrease the monster's HP to 0, while the warrior's HP is always larger than 0?

Note: Initially the dice is at cell (1,1), and we will ignore the damage at this time.

Technical Specification

- Described in the statement.

Input Format

The first line is an integer T (T<15) which indicates the number of test cases. Each test case contains 8 lines. The first line contains three numbers, n1, n2, n3, separated by space, which are distinct integers chosen from 1 to 6. The following 7 lines describe the status of the board, where each line contains 7 characters. Each character is either "+" or "-", where "+" means a positive cell, and "-" means a negative cell. (Precisely, we print the rows of the board from N to S, and within each row, we print the cells from W to E. Thus, the first character in the 7 lines corresponds to the NW corner, and the last character in the 7 lines corresponds to the SE corner.)

Output Format

For each test case, output one line "yes" if the warrior can kill the monster successfully, otherwise "no".

Example

Sample Input:	**Sample Output:**
2 1 2 3 ------- -+----- ------- ------+ ----++- -+++--- --+---- 4 6 5 ------- ------- ------- ------- ------- ------- -------	yes no

Problem 4. Garbage Service

(Time Limit: 3 seconds)

Problem Description

The university has opened the Service-Learning Program-Campus Service course to encourage freshmen to embrace and love their own community and environment. One of the freshman has been assigned to the trash pickup service. Suppose the region he is in charge is rectangular (u,v), and he begins at coordinates (x,y). The trash are all visible to him. For two points (x1,y1) and (x2,y2), the distance is defined by |x1-x2|+|y1-y2|. He derived a tactic of picking up the trash that is nearest to his current position, and the tie is broken by first choosing the smaller X-coordinate and then the smaller Y-coordinate. Please write a program to compute the distance he has traveled under this tactic.

Consider the scenario below, the region in charge is 10 by 10, and the freshman begins at the coordinate (3,3). The trashes are at (1, 2), (2 3), (3, 2), and (9, 8). Under his tactic, he will have to travel (3,3) -> (2,3) -> (1, 2) -> (3, 2) -> (9, 8), and the total distance is 1+2+2+12=17.

Input Format

The first line of the input will contain the size of the region in charge u and v. The second line will contain the initial coordinate of the freshman x and y. The third line will specify how many pieces of trashes are visible, and following lines specify the coordinates of the trashes. All the coordinates are nonnegative integers at most 10000. The number of trashes may be up to 100000.

Output Format

Output the total traveled distance.

Example

Sample Input:	Sample Output:
10 10 3 3 4 1 2 2 3 3 2 9 8	17

Problem 5. Guard the Roads

(Time Limit: 1 second)

Problem Description

One day, the President would like to visit a city. For safety, police needs to guard all the roads of the city. Each road is straight and connects two points (crossroads or dead ends) with the same length. The roads are connected in a tree structure, a structure without cycle. A policeman will be placed at one point and he can watch on all roads adjacent to the point he stands. Each point stands at most one policeman and each policeman must have at least one colleague guarded at the other point of a road adjacent to him for backup. Please write a program to compute the minimum number of required policemen to guard the city roads.

Technical Specification

Each point in the city has a unique index between 1 and *n*. For each point except the root, its index is larger than the index of its parent.

Input Format

The first line of the input data contains an integer, which indicates the number of test cases to follow. For each test case, the first line is an integer n, $2 \leq n \leq 10000$, which indicates the number of points. Each of the next n-1 lines consists of two integers separated by a space, which indicates the indices of the points of a road.

Output Format

Output the minimum number of policemen, which satisfies the requirement of the problem.

Example

Sample Input:	Sample Output:
2 5 1 2 1 3 2 4 3 5 8 1 2 1 3 2 4 2 5 3 6 6 7 7 8	3 4