Semester Break Problem Solving Competition

Contest 5
September 30, 2012

Problem A – Segments

n segments and m points on x-axis are given. For each of the m given points determine the number of segments that contain the given point. Point x belongs to segment [a,b] if a <= x <= b.

INPUT

The first line of the standard input contains 2 natural numbers 1 <= n <= 10^5 and 1<= m <= 10^5 - number of segments and number of points, respectively. Next line contains m numbers delimited by space - coordinates of points. Each of the next n lines contains 2 numbers delimited by space - left and right coordinate of the corresponding segment (left coordinate is strictly less then the right coordinate). All coordinates are natural numbers not greater than 10^9.

OUTPUT

To the standard output for each point write the number of segments that contain it. All numbers should be written in separate lines and in the same order as the points in the input.

SAMPLE IO

Input	Output
3 4 5 1 8 9 6 7 4 9 2 5	2 0 1 1

Problem B – GreedyHydra

Hydra is some very greedy animal. A hydra has 9 heads when he is born, and many more new heads will come out when he grows up. Of course, some old heads will break off because of caducidy.

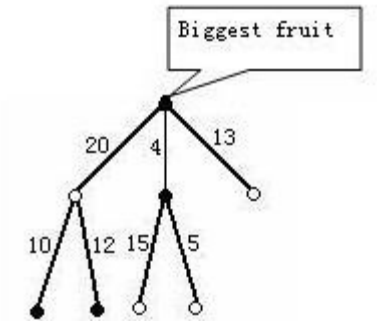
One day, a hydra with M heads finds a tree with N fruits on it. He is very delighted and wants to eat this tree instantly. Since he has M heads, he must divide these N fruit into M groups, each group contains at least 1 fruit, and each head will eat a group of fruits.

The biggest head among the M heads is named "Boss", it must eat neither more nor less than K fruits, and, in the nature of things, the biggest fruit included. These fruits are connected by N-1 branches, and there exists a path made up with branches between each pair of fruit.

If two fruit connected by a single branch is put in different groups, the corresponding two heads will break the branch and eat the two fruits, otherwise the corresponding head will eat the two fruits without breaking the branch. Eating branches is not very comfortable of course, so every branch has a weight of illness, and the weight of illness of this hydra is the sum of the weights of illness of all branches he has eaten.

Your task is to help the hydra to minimize his weight of illness.

The picture below is an example.



N=8,M=2,K=4.The bigger head eats 4 fruits(full points), the smaller head eats 4 fruits(empty points). The branch signed by a thin segment is eaten by the hydra.

INPUT

The first line contains N(1<=N<=300), M(2<=M<=N), K(1<=K<=N), separated by single spaces. The N fruits are numbered 1..N, and the biggest fruit is always numbered 1. N-1 lines follow, each contains 3 integers i,j,k separated by spaces denoted that there is a branch between fruit i (1<=i<=N) and fruit j (1<=j<=N) and the weight of illness of this branch is k(0<=k<=100000).

OUTPUT

Print the minimum weight of illness of the hydra. If we can't divide the fruit into M groups, output "-1"(without quotes).

SAMPLE IO

Input	Output
8 2 4 1 2 20 1 3 4 1 4 13 2 5 10 2 6 12 3 7 15 3 8 5	4

Problem C – Sequence

You are given some sequence of unlimited number of elements where you have 1 copy of one, 2 copies of two, 3 copies of three...

Your task is to find N-th element of such sequence.

INPUT

The input consists of T test cases. The number of test cases T is given in the first line of the input file. Each test case begins with a line containing an integer N , 1 <= N <= 2^31 - 1, that represents the position in sequence.

OUTPUT

The output should contain the N-th element of the sequence, one per line.

SAMPLE IO

Input	Output
2 4 7	3 4

Explanation: The sequence looks like this: 1, 2 , 2 , 3, 3 , 3, 4 , 4, 4, 4 … So the 4 -th element is 3, and the 7-th element is 4.