Remote Towers

Input File: Problem3.txt

You are given a system of remote towers. Each tower has a range and can send information to neighboring towers as long as the distance is less than or equivalent to the sending tower's range. The towers are based on an old communication protocol A. However, there is another new and better protocol B available. We are thinking to upgrade some towers to send information using protocol B to achieve better bandwidth.

There is one important critical restriction, that is, if a tower X is using the new protocol B then all towers within X's range must also be running protocol B to understand the data sent from X. The reverse is not necessary - towers running the new protocol B can be sent data from towers using the old protocol A.

Your task is to find the best set of towers to upgrade from protocol A to protocol B. There is some advantage to upgrading a tower, but there are also additionally installation costs. So each tower will have a score, which can be positive or negative, which is the value of upgrading the tower. Select the arrangement of towers to upgrade in a manner that the total score of the upgraded towers is maximized.

Input

The input consists of multiple test cases n. Each test case starts with the number of towers, T. The following T lines; each contain 4 integers: x, y, r, s (where x,y are tower's coordinates, r is range of tower and s is score - value of upgrading to the new protocol).

Limits:

$1 \le n \le 55$
$1 \le T \le 500$
$-10000 \le x, y \le 10000$
$1 \le r \le 20000$
$-1000 \le s \le 1000$
No two towers will have the same coordinates.

Output

For each test case, print a single line with following format: **Case # X: score**
where X is the test case number, starting from 1, and score is the total score for the best choice of towers.

Sample Input

2
1

-18 81 29 22
5
0 1 7 10
0 -1 7 10
5 0 1 -15
10 0 6 10
15 1 2 -20

Sample Ouput:
Case # 1: 22
Case # 2: 5