

Problem B

Aircraft Tracking Radar

Max no. of test cases: 15

Time limit: 1 second

Flight Radar Systems are critical to the detection and tracking of aircrafts. The systems ensure the air traffic controllers know where the aircrafts are at every moment of flights. It is important for the controllers to identify each flight on the radar screen and to ensure aircrafts keep a safe distance from each other.

In one complete radar scan, information such as aircraft ID, altitude, destination, ground speed, etc., are shown on the radar screen for controllers to see. For this problem, let's assume the aircraft IDs are unique 5 digit positive integers, and the aircraft location in the sky is transformed into (ID, x, y, alt) , where ID is the unique aircraft ID, x, y are coordinates on the radar screen, and alt is altitude of the aircraft. The system uses only integer values.

For the next system upgrade, aircraft proximity warning is to be activated to help aircraft controllers monitor those aircrafts. Two aircrafts, (ID_i, x_i, y_i, alt_i) and (ID_j, x_j, y_j, alt_j) are too close and thus need special monitoring if

1. the roundup Euclidean distance on the radar screen is less than or equal to a preset distance threshold, D_{xy} , or
2. the roundup Euclidean distance on the radar screen is less than or equal to $2 \times D_{xy}$ AND altitude difference is less than or equal to D_{alt} .

Please write a program to find all pair of aircrafts that need special monitoring by the aircraft controllers.

Input File Format

First line of input has one integer, indicating the number of test cases. For each test case, the first line contains three integers n , D_{xy} , and D_{alt} , which are the number aircrafts ($1 \leq n \leq 5000$), the Euclidean distance threshold and the altitude threshold, respectively. For the next n lines, each line contains 4 integers to represent one aircraft, namely ID , x , y , alt , where $10000 \leq ID \leq 99999$, $-10^5 \leq x, y \leq 10^5$, and $10000 \leq alt \leq 50000$, respectively.

Output Format

For each test case, output all aircraft that requires special monitoring by the aircraft controllers according to the conditions set forth in the problem statement. Each line should contain 4 integers, ID_i , ID_j , E_{dist} , and Alt , where ID_i and ID_j ($ID_i < ID_j$) are aircraft IDs, E_{dist} is the roundup Euclidean distance on the radar screen of these two aircrafts, and alt is the difference in altitude between these two aircrafts. All output should be ordered by aircraft IDs from smaller ID to larger ID. The last line for each case should be an integer indicating the total number of warnings generated.

Sample Input

```
2
5 5000 1000
50000 -1400 1500 9500
30000 120 1200 9535
20000 120 1200 10000
40000 -1000 1300 10000
10000 110 1500 8500
3 10000 2000
22222 -100 100 8900
11111 -100 200 8900
55555 100 300 12000
```

Output for the Sample Input

```
10000 20000 301 1500
10000 30000 301 1035
10000 40000 1128 1500
10000 50000 1510 1000
20000 30000 0 465
20000 40000 1125 0
20000 50000 1550 500
30000 40000 1125 465
30000 50000 1550 35
40000 50000 448 500
10
11111 22222 100 0
11111 55555 224 3100
22222 55555 283 3100
3
```