

Problem G. Support or Not

Input file: *standard input*
Output file: *standard output*
Time limit: 8 seconds
Memory limit: 512 mebibytes

There are n spheres in the three-dimensional space, labeled by $1, 2, \dots, n$. The center of the i -th sphere is at point (x_i, y_i, z_i) , and its radius is r_i .

Let us denote the distance between spheres i and j as

$$d(i, j) = \max \left(0, \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2 + (z_i - z_j)^2} - r_i - r_j \right).$$

That means choosing two points P and Q , where P is inside or on the surface of sphere i and Q is inside or on the surface of sphere j , and minimizing the Euclidean distance between P and Q .

There are $\frac{n(n-1)}{2}$ pairs (i, j) such that $1 \leq i < j \leq n$. Please find the smallest k values among the values of $d(i, j)$ for all these pairs.

Input

The first line of the input contains an integer T ($1 \leq T \leq 3$), denoting the number of test cases.

Each test case starts with a single line containing two integers n and k ($2 \leq n \leq 100\,000$, $1 \leq k \leq \min(300, \frac{n(n-1)}{2})$), denoting the number of spheres and the parameter k .

Each of the next n lines contains four integers, x_i, y_i, z_i , and r_i ($0 \leq x_i, y_i, z_i \leq 10^6$, $1 \leq r_i \leq 10^6$), describing i -th sphere.

Output

For each test case, print k lines, each line containing a single integer: the smallest k values among $d(i, j)$ in non-decreasing order. To avoid precision error, print the values of $\lceil d(i, j) \rceil$: the values of the respective $d(i, j)$ rounded up. For example, $\lceil 5 \rceil = 5$, and $\lceil 5.1 \rceil = 6$.

Example

standard input	standard output
1	0
4 6	0
0 0 0 1	0
0 3 2 2	1
3 2 1 1	1
1 1 2 2	2