Iridescent Universe 2

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2.5 seconds
Memory limit:	1024 megabytes

The Universe of Cup is where the Little Cyan Fish lives. The biggest planet in the universe, called the Rainow-Earth, is a sphere centered at $(0, 0, 0)$ with a radius r in the 3D Euclidean space.

Little Cirrhinus Molitorella (小鯪鱼) is running the airlines in the Rainow Earth. There are $2n$ cities as points on the Rainow Earth. There is a flight along the shortest route between the $(2i - 1)$-th city and the $2i$-th city on the surface of the Rainow Earth for each $i = 1, 2, \ldots, n$.

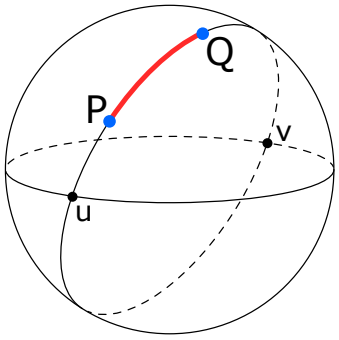

Figure 1: The shortest route between two points on a sphere.
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Little Cyan Fish is going to build a university — Pretty Kind University. However, the busy air traffic disturbs Little Cyan Fish a lot, and he wants to build the university at a place that is as far away from the noise as possible. Given his tolerance level k, Little Cyan Fish wants to find the maximum value of such d that at most k of the n flights have the minimum distance from the university **strictly** less than d.

Note that the distance between two points is calculated by measuring the shortest path on the surface of the Rainow Earth, which is NOT the Euclidean distance in 3D Euclidean space.

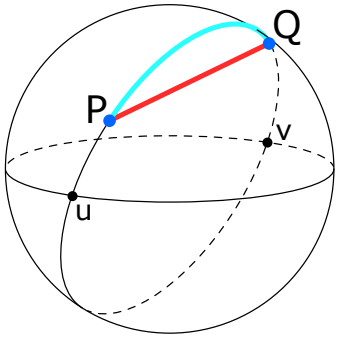

Figure 2: The distance between P and Q is the length of the light blue route, NOT the red segment.
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Input

There are multiple test cases in a single test file. The first line of the input contains an integer T ($T \geq 1$), indicating the number of test cases. For each test case:

The first line contains three integers n ($1 \leq n \leq 100$), k ($0 \leq k < n$), and r ($1 \leq r \leq 100$), indicating the number of flights, Little Cyan Fish's tolerance level, and the radius of the Rainow Earth.

The next $2n$ lines describe all the cities. The i-th line of these lines contains three integers x, y, and z ($-100 \leq x, y, z \leq 100$, $x^2 + y^2 + z^2 > 0$), indicating that the i-th city has coordinates $\left(\frac{rx}{\sqrt{x^2+y^2+z^2}}, \frac{ry}{\sqrt{x^2+y^2+z^2}}, \frac{rz}{\sqrt{x^2+y^2+z^2}}\right)$.

It is guaranteed that the $(2i-1)$-th city and the $2i$-th city cannot coincide with each other and cannot be directly opposite each other on the Rainow Earth for each $i = 1, 2, \ldots, n$. Therefore, the shortest path on the surface of the Rainow Earth for each flight is uniquely determined.

It is guaranteed that the sum of n over all test cases does not exceed 100.

Output

For each test case, output a line containing a single real number, indicating the maximum value of d.

Your answer is acceptable if its absolute or relative error does not exceed 10^{-6}. Formally speaking, suppose that your output is x and the jury's answer is y, and your output is accepted if and only if $\frac{|x-y|}{\max(1,|y|)} \leq 10^{-6}$.

Example

standard input	standard output
3 1 0 100 0 0 1 0 1 0 2 0 100 1 1 0 1 -1 0 -1 0 1 -1 0 -1 2 1 100 1 1 0 1 -1 0 -1 0 1 -1 0 -1	235.619449019234 117.809724509617 235.619449019234

Note

For the first test case, the exact answer is 75π.

For the second test case, the exact answer is $\frac{75}{2}\pi$.

For the third test case, the exact answer is 75π.