Cops and Robbers

You are a cop and have the unfortunate circumstance of being the only cop at the scene of a robbery with multiple robbers. Unfortunately, all of the robbers have equally split the loot and are running in different directions. Lucky for you, due to your superior professional training, you are faster than all of the robbers! It's also helpful that the robbers aren't particularly bright. They haven't bothered to bring a getaway car and once they pick a direction to run, they continue running in that direction no matter what. (So, you know exactly where they'll be at any point in time.)

Of course, there are many other crimes to stop, so you would like to catch all of the robbers as quickly as possible. We assume that you have a instantaneous taser, so that once you catch up to a particular robber, you can taze him immediately and he'll remain in that position until another cop comes along and books him. As soon as this happens, you immediately move onto catching the next robber, without losing any time.

The Problem

Assuming that you start at (0, 0), given your speed, as well as the initial positions, speeds and fleeing directions of all of the robbers, determine the minimum amount of time it will you take to catch all of them.

The Input

There will be several robberies to solve. Each robbery begins with two integers, N and C, separated by a space, denoting the number of robbers ($1 \leq N \leq 7$) and the speed of the cop ($0 < C \leq 100$) in units/sec, respectively.

Each of the next N lines will have four space-separated integers, X, Y, D and S. (X, Y) will representing the initial position of that particular robber at time t = 0 ($-100 \leq X, Y \leq 100$), D represents the direction of movement in degrees (0 degrees is the positive X axis, 90 degrees is the positive Y axis), and S ($0 \leq S < C$) is the speed of that robber in units/sec. It is assumed that all robbers start moving immediately at time t = 0.

All of the input cases will be constructed such that the desired minimum time does not exceed 10000.

The input will end with a line with two 0s.

The Output

For each test case, output a single real number on its own line, representing the least amount of time needed for the cop to catch all of the robbers. Print this number to exactly 2 decimal places, rounded. Any answer within 0.01 of the correct answer will be deemed correct.

Sample Input

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2 25
19 19 32 10
6 45 133 19
5 10
10 20 45 3
30 10 135 4
100 100 219 5
10 100 301 4
30 30 5 3
0 0
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Sample Output

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12.62
12.54
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