Coding Area

Lifeguard Prob

Problem Description

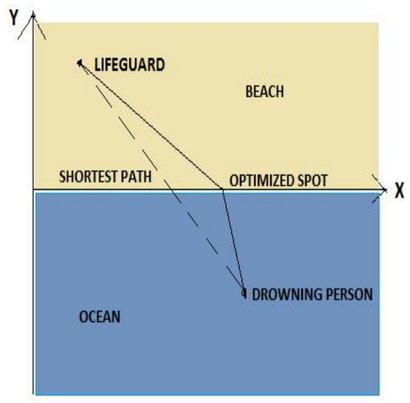
A life guard is sitting on a beach on a lookout for potential emergencies.

He suddenly notices a person who is drowning and springs to action.

He runs up to the sea with a speed f*V km/hr, then he swims straight to the person at the rate V km/hr (both in straight lines and where f is a multiplying factor as humans run much faster than they can swim).

He wants to minimize the time taken to get to that person.

See the below image for better understanding :



Since the lifeguard runs faster, it will save some more time to run a longer distance rather than going straight and thus swimming a long distance.

However, this comes with the trade-off that running longer can actually mean going a longer distance thus taking more time.

Thus, it can be logically inferred that, there must exist a spot on the Beach-Sea Interface where, if the lifeguard directly runs to from his starting location, and then swims directly to the drowning person, it'll take the least time.

Given the starting location , the location of the drowning person and the multiplying factor f, find the optimized spot for fastest time.

Assumptions/Problem Explanation:

1. Consider that everything is in a two dimensional (2D) plane.

The x axis represents the Beach-Sea interface, positive Y axis is towards land and negative Y-axis towards sea (See image above).

2. The Y-axis along with origin is at some arbitrary location to the left of both the lifeguard and the drowning person. Since the origin point remains the same for both of them and the staring locations are given relative to the origin , its actual location does not matter. The only thing to note is, the origin and Y axis is to the left of both of them, so beach is always in 1st quadrant and sea in 4th. Thus, the positions of lifeguard and the drowning person are given as their (x,y) co-ordinates. (7,5) means the person is 7 units on the axis and 5 units on the positive y axis, and hence on the beach. Similarly, (7,-5) means the person is 7 units on the axis and 5 units on the negative Y axis, and hence in sea.

3. The lifeguard both runs and swims in perfectly straight lines.

4. With regards to everything explained above, your task is to find a point on the Beach-Sea Interface (X -axis) (x_optimized,0) to where if the lifeguard runs directly from his starting position and then swims directly from the point to the drowning person, it'll take the least amount of time.

5. All calculations must be done upto 6 decimal points accuracy and the output must be upto 6 decimal points as well.

Constraints

0 <= x_l < 100 (Integer)

0 <= y_l < 100 (Integer)

0 <= x_w < 100 (Integer)

-500 < y_w < 0 (Integer)

1 < f <= 15 (Integer)

Input Format

The input shall consist of 3 parameters :

1. Starting position of the lifeguard in terms of his coordinates (x_l,y_l).

2. Position of the drowning person (x_w,y_w)

3. The multiplying factor f.

These parameters would be given in the following order in 5 different lines:

x_l

y_l

x_w

y_w

f

Output

Output must be a single number, x_optimized, as described above. The output must be having accuracy to 6 decimal places. That is, 1 should be represented as 1.000000

Timeout

1

Test Case

Example 1

Input

1

1

1

-1

1.2

Output

1.000000

Upload Solution [Question : F]

☐ I, **pritimoy sarkar** confirm that the answer submitted is my own.

☐ Took help from online sources (attributions)

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