

Example. Solve the system:

$$\begin{cases} \sqrt{(x-x_1)+(y-y_1)} - \sqrt{(x-x_2)+(y-y_2)} - r_1 + r_2 = 0 \\ \sqrt{(x-x_1)+(y-y_1)} - \sqrt{(x-x_3)+(y-y_3)} - r_1 + r_3 = 0 \end{cases}$$

if $x_1 = 8, y_1 = 5, r_1 = 2.5;$

$x_2 = 1.5, y_2 = 1, r_2 = 1.5;$

$x_3 = 1.5, y_3 = 6, r_3 = 1.$

Record of calculations:

dig = 10 // The number of the digits after the decimal point in the answer.

N = 15

Step 1:

Initial segment: [3, 4.5].

The length of the segment = 1.5.

The length of the subsegment = 0.1.

Output:

Minimal value: $f = 0.080022135643$

$x = 3.6$

$y = 3.8$

Step 2:

Segment: [3.525, 3.675].

The length of the segment = 0.15.

The length of the subsegment = 0.01.

Output:

Minimal value: $f = 0.010603278414$

$x = 3.615$

$y = 3.835$

Step 3:

Segment: [3.6075, 3.6225].

The length of the segment = 0.015.

The length of the subsegment = 0.001.

Output:

Minimal value: $f = 0.000082334559$

$x = 3.6195$

$y = 3.8285$

Step 4:

Segment: [3.61875, 3.62025].

The length of the segment = 0.0015.

The length of the subsegment = 0.0001.

Output:

Minimal value: $f = 0.000082334559$

$x = 3.6195$
 $y = 3.8285$

Step 5:

Segment: [3.619425, 3.619575].

The length of the segment = 0.00015.

The length of the subsegment = 0.00001.

Output:

Minimal value: $f = 0.000011149349$

$x = 3.619505$

$y = 3.828445$

Step 6:

Segment: [3.6194975, 3.6195125].

The length of the segment = 0.000015.

The length of the subsegment = 0.000001.

Output:

Minimal value: $f = 0.000000429083$

$x = 3.6195015$

$y = 3.8284455$

Step 7:

Segment: [3.61950075, 3.61950225].

The length of the segment = 0.0000015.

The length of the subsegment = 0.0000001.

Output:

Minimal value: $f = 0.000000129879$

$x = 3.61950135$

$y = 3.82844585$

Step 8:

Segment: [3.619501275, 3.619501425].

The length of the segment = 0.00000015.

The length of the subsegment = 0.00000001.

Output:

Minimal value: $f = 0.000000002829$

$x = 3.619501405$

$y = 3.828445775$

Step 9:

Segment: [3.6195013975, 3.6195014125].

The length of the segment = 0.000000015.

The length of the subsegment = 0.000000001.

Output:

Minimal value: $f = 0.000000001109$

$$x = 3.6195014035$$
$$y = 3.8284457775$$

Step 10:

Segment: [3.61950140275, 3.61950140425].

The length of the segment = 0.0000000015.

The length of the subsegment = 0.0000000001.

Output:

Minimal value: $f = 0.000000000063$

$$x = 3.61950140385$$

$$y = 3.82844577675$$

Step 11:

Segment: [3.619501403775, 3.619501403925].

The length of the segment = 0.00000000015.

The length of the subsegment = 0.00000000001.

Output:

Minimal value: $f = 0.000000000007$

$$x = 3.619501403835$$

$$y = 3.828445776795$$

Answer:

$$x = 3.6195014038$$

$$y = 3.8284457768$$

$$r = 2.0344577679$$