

## 1 Network

Crazyman plans to travel across the flat and incredibly boring landscape of Crazyland. He will start his trip at the point  $(x_s, y_s)$  and end at the point  $(x_e, y_e)$ , where  $x_s, x_e, y_s$  and  $y_e$  are integers and his trip is any continuous path through the planar landscape of Crazyland (and thus is not confined to just integer valued coordinates). All points in Crazyland are expressed in cartesian coordinates  $(x, y)$  where  $x, y$  are (not necessarily positive) integers.

Crazyland has a single telecom service provider who has constructed  $n$  signal towers to provide mobile coverage across Crazyland. These towers are numbered  $1, \dots, n$  and the  $i^{\text{th}}$  tower is located at the position  $(x_i, y_i)$ . Each tower  $i$  has transmission power  $p_i$  and a power drop rate  $r_i$ . The strength of a the signal due to tower  $i$  at some point  $p = (x, y)$  is given by

$$\text{sig}(p, i) = \max(0, p_i - (r_i \times d))$$

where  $d$  is the Euclidean distance  $\sqrt{(x - x_i)^2 + (y - y_i)^2}$ .

At any point  $p$ , Crazyman's happiness is given the maximum signal strength of all the towers at that point. That is

$$\text{hap}(p) = \max_{1 \leq i \leq n} \text{sig}(p, i)$$

Crazyman's overall happiness along a particular route is his minimum happiness at any point in the route. Crazyman would like to travel by a route that maximises the overall happiness along the route and your aim is to determine the largest integer that is less than or equal to this value.

### Input format

- The first line of input contains a single integer  $n$ .
- The  $i^{\text{th}}$  of the  $n$  lines that follow contains 4 space-separated integers giving the values of  $p_i, r_i, x_i, y_i$ .
- The next line (line  $n + 2$ ) contains 2 space-separated integers giving  $x_s$  and  $y_s$ .
- The last line (line  $n + 3$ ) contains 2 space-separated integers giving  $x_e$  and  $y_e$ .

### Output format

Output a single integer.

### Test Data

In all inputs you may assume that  $-1000 \leq x_i, y_i, x_s, y_s, x_e, y_e \leq 1000$ . Further,  $1 \leq p_i \leq 5000$  and  $1 \leq r_i \leq 10$ .

- Subtask 1 (40 marks) :  $1 \leq N \leq 50$
- Subtask 2 (60 marks) :  $1 \leq N \leq 1000$

### Sample Input

```
1
70 3 -1 2
-3 -2
4 3
```

### Sample Output

```
54
```

### Limits

- *Time limit:* 2 s
- *Memory limit:* 128 MB