

ECE30017, Fall 2021

Problem Solving through Computational Thinking

Week 11

- **C8. Wells**

Deadline: 11:59 PM, 12 November (Fri)

- **P8. Way Back Home**

Deadline: 11:59 PM, 16 November (Tue)

C8. Wells

The tribe of Isaac and the tribe of Abimelech are sharing a border which runs on a straight horizontal line; Isaacs live in the south side, and Abimeleches in the north side. Abimeleches form n number of villages for $n \leq 10000$. As we represent the border line as $y = 0$, the location of the i -th vileage of Abilemech is represented as (x_i, y_i) where $-10000 \leq x_i \leq 10000$ and $0 \leq y_i \leq 10000$.

As gift to Abimelech, Isaac decided to dig one or multiple wells on the border lines such that every village of Abimelech can reach one of the wells within distance d .

Write a program that finds the minimum number of wells that Isaac needs to dig for given locations of Abimelech villages.

Input data

- Input is given as text via the standard input
- The first line has two integers n and d . n is the number of Abimeleches villages, and d is the maximum distance between a Abimeleches villesgae and a well.
- From the second to the $(n+1)$ -th lines, each line has a pair of integers x_i and y_i which is a location of a Abimeleches village.

Output data

- Print the minimum number of wells to the standard output. Your program should return the answer within 0.5 second.

Test case example

Input

```
3 2
1 2
-3 1
2 1
```

Output

```
2
```

Team for C8

801	이인석	강석운
802	정성목	권혁찬
803	박건희	전영우
804	이혜림	이수아
805	박은찬	최시령
806	김영표	차경민
807	남진우	홍순규
808	김해린	이찬효
809	강동인	

P8. Way Back Home

Jacob and his folks had started to walk on a long road returning home. Since the road was narrow, everyone was separated and walking in his/her own tempos.

But, all of a sudden, the sun went down and it came so dark that nobody could see anything. From that moment, since it was too scary, each one started to move forward with a constant speed, and once one met another, they form a group to move together at the slower speed between them.

Given positions and speeds of households at sunset, we can predict where each person will be located and with whom the person moves together after a given amount of time (assume that the night is not over by then).

Write a program that finds the number of groups of Jacob's folks that move together after a given amount of time for given locations and the speeds of Jacob's folks at the sunset moment.

Input data

- Input is given as text via the standard input
- The first line has two numbers n and t for $1 \leq n \leq 100000$ and $1 \leq t \leq 1000000000$. n is the number peoples and t is the amount of times after which we want to know the status of the folks.
- From the second to the $(n+1)$ -th lines, each line has a pair of integers p_i and v_i where p_i is the location and v_i is the speed of a person at the sunset moment. Both p_i and v_i do not exceed 1000000000.

Output data

- Print the number of groups (i.e., peoples moving together) formed after t time passed. Your program should return the answer within 0.5 second.

Test case example

Input

```
5 3
0 1
1 2
2 3
3 2
6 1
```

Output

```
3
```