ECE30017, Fall 2020
Problem Solving through Computational Thinking

Week 11

- **C8. Wells**
  Deadline: 11:59 PM, 14 November (Fri)

- **P9. Way Back Home**
  Deadline: 4:00 PM, 16 November (Mon)

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

Team 801	한정섭	김윤정	
Team 802	황소정	김승우	
Team 803	송진범	최재혁	
Team 804	정희석	한찬솔	
Team 805	김지원	신희주	
Team 806	윤지영	박수현	
Team 807	최우석	전해주	
Team 808	김기훈	정예은	
Team 809	김석진	박민준	
Team 810	윤다은	홍원표	
Team 811	송수근	홍석현	
Team 812	김유진	김준서	
Team 813	이예준	정원식	
Team 814	정현섭	지성민	
Team 815	강하영	임예찬	정진혁

P9. 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 $1 \le n \le 100000$ and $1 \le t \le 1000000000$. 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
```