

Problem E

Terrestrial Stations

Time limit: 3 seconds

Problem Description

In a state, there are many towns. To adapt to the digital age, the governor wishes to provide digital television service to each town by setting up terrestrial stations (also known as digital broadcast stations) in some of the towns. Assuming that the service range is the same for every terrestrial station, that is, any person within distance R from a terrestrial station will be able to receive digital television signals. For ease of description, the location of each town is represented by a 2-dimensional coordinate. For instance: there are five towns in the state, represented by $P_1, P_2, P_3, P_4,$ and P_5 . Their coordinates are $(1, 3), (5, 3), (5, 6), (7, 4), (8, 6)$, respectively. When $R = 3$, by setting up terrestrial stations at P_1 and P_4 , we can provide television signals to every town (see Figure 1). When $R = 5$, setting up one terrestrial station at P_3 alone is enough (see Figure 2).

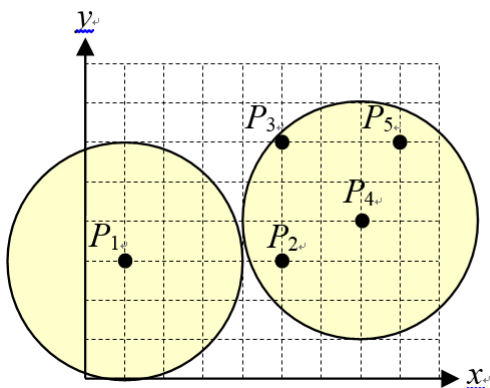


Figure 1: $R = 3$.

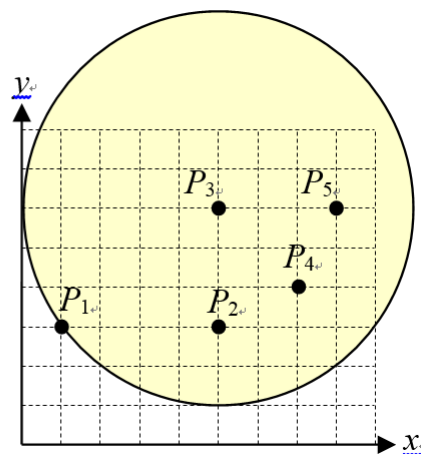


Figure 2: $R = 5$.

In this problem, you are given the coordinates of N towns P_1, P_2, \dots, P_N , and two positive integers R and k , where $1 \leq R \leq 10000$ and $1 \leq k \leq N \leq 22$. Given the coordinates of all towns in the state (every town has a different coordinate), please determine if it is possible to provide digital television signals to all towns by setting up at most k terrestrial stations at the towns, and output the selected towns.

Technical Specification

- The number of test cases is at most 10.
- The number N of towns is an integer between 1 and 22.
- The x - and y -coordinate (x_i, y_i) for each town are integers between 1 and 10000.
- The range R of the terrestrial stations is an integer between 1 and 10000.
- The positive integer k is between 1 and N .

Input Format

The first line of each test case gives the 3 integers N , R , and k ($1 \leq N \leq 22$, $1 \leq R \leq 10^4$, and $1 \leq k \leq N \leq 22$), where N represents the number of towns, R represents the range of each terrestrial station, and k represents the maximum number of terrestrial stations. The first line is followed by N lines which describe the integer coordinates of the N towns, where the i th line gives x_i and y_i of town P_i (where $1 \leq x_i, y_i \leq 10000$). The input is terminated by a line containing three zeros, which should not be processed.

Output Format

For each case, if it is possible to provide digital television service to all towns by setting up at most k terrestrial stations, output the minimum number of terrestrial stations required in the first line, and the towns to set the terrestrial stations in the next line (output the stations in increasing order, separate each base station with a space). If there are multiple possible ways to set up the terrestrial stations, output the one with the smallest lexicographic order. If it is not possible to provide service by setting up at most k terrestrial stations, output -1.

Sample Input

```
5 3 3
1 3
5 3
5 6
7 4
8 6
5 3 1
1 3
5 3
5 6
7 4
```

8 6
0 0 0

Sample Output

2
1 3
-1