

IOI '09 P2 - Hiring

Time limit: 1.5s **Memory limit:** 64M

IOI '09 - Plovdiv, Bulgaria

You have to hire workers for a construction project. There are N candidates applying for the job, numbered from 1 to N inclusive. Each candidate k requires that if he is hired, he must be paid at least S_k dollars. Also, each candidate k has a qualification level Q_k . The regulations of the construction industry require that you pay your workers in proportion to their qualification level, relative to each other. For example, if you have two workers A and B , and $Q_A = 3 \times Q_B$, then you have to pay worker A exactly three times as much as you pay worker B . You are allowed to pay your workers non-integer amounts of money. This even includes quantities that cannot be written with a finite number of digits in decimal form, such as a third or a sixth of a dollar.

You have W dollars at hand and you want to hire as many workers as possible. You decide whom to hire and how much to pay them, but you have to meet the minimum salary requirements of those you choose to hire, and you have to obey the industry regulations. You also have to fit within your budget of W dollars.

The nature of your project is such that the qualification level is completely irrelevant, so you are only interested in maximizing the number of workers without regard to their qualification level. However, if there is more than one way to achieve this, then you want to select the one where the total amount of money you have to pay your workers is as small as possible. In case there is more than one way to achieve this, then you are indifferent among these ways and you would be satisfied with any one of them.

Write a program that, given the different salary requirements and qualification levels of the candidates, as well as the amount of money you have, determines which candidates you should hire. You must hire as many of them as possible and you must do so with as little money as possible, while complying with the industry regulations specified above.

Input Specification

Your program must read from standard input the following data:

- The first line contains the integers N ($1 \leq N \leq 500\,000$) and W ($1 \leq W \leq 10^{10}$), separated by a space.
- The next N lines describe the candidates, one candidate per line. The k^{th} of these lines describes candidate number k and it contains the integers S_k ($1 \leq S_k \leq 20\,000$) and Q_k ($1 \leq Q_k \leq 20\,000$), separated by a space.

Output Specification

Your program must write to standard output the following data:

- The first line must contain a single integer H , the number of workers that you hire.
- The next H lines must list the identifying numbers of the candidates you choose to hire (each of them a different number between 1 and N), one per line, in any order.

Scoring

For any given test case, you will receive full points if your choice of candidates enables you to achieve all of your goals, while satisfying all constraints. If you produce an output file with a correct first line (*i.e.*, a correct value of H), but which does not meet the above description, you will receive 50% of the points for that test case. The latter will be the case even if the output file is not properly formatted, as long as the first line is correct.

For a number of tests, worth a total of 50% of the points, N will not exceed 5 000.

Sample Input 1

```
4 100
5 1000
10 100
8 10
20 1
```

Sample Output 1

```
2
2
3
```

Explanation 1

The only combination for which you can afford to hire two workers and still meet all the constraints is if you select workers 2 and 3. You can pay them 80 and 8 dollars respectively and thus fit in your budget of 100.

Sample Input 2

```
3 4
1 2
1 3
1 3
```

Sample Output 2

```
3
1
2
3
```

Explanation 2

Here you can afford to hire all three workers. You pay 1 dollar to worker 1 and 1.50 dollars each to workers 2 and 3, and you manage to hire everyone with the 4 dollars that you have.

Sample Input 3

```
3 40
10 1
10 2
10 3
```

Sample Output 3

```
2
2
3
```

Explanation 3

Here you cannot afford to hire all three workers, as it would cost you 60 dollars, but you can afford to hire any two of them. You choose to hire workers 2 and 3 because they would cost you the smallest sum of money, compared to the other two-worker combinations. If you were to hire workers 1 and 2 you would have to pay them at least 10 and 20 dollars respectively. If you were to hire 1 and 3, then you would have to pay them at least 10 and 30 dollars respectively.