2000-2001 ACM Northeastern European Regional Programming Contest

Problem E
"Binary Search"

Input file SEARCH.IN

Output file SEARCH.OUT

Time limit 15 seconds per test

The program fragment below performs binary search of an integer number in an array that is sorted in a nondescending order:

Pascal (file "sproc.pas")

```
const
  MAXN = 10000;
var
  A: array[0..MAXN-1] of integer;
  N: integer;

procedure BinarySearch(x: integer);
var
  p, q, i, L: integer;
begin
  p := 0;   { Left border of the search  }
  q := N-1; { Right border of the search }
  L := 0;   { Comparison counter         }
  while p <= q do begin
    i := (p + q) div 2;
    inc(L);
    if A[i] = x then begin
      writeln('Found item i = ', i,
        ' in L = ', L, ' comparisons');
      exit
    end;
    if x < A[i] then
      q := i - 1
    else
      p := i + 1
  end
end;
```

C (file "sproc.c")

```
#define MAXN 10000

int A[MAXN];
int N;

void BinarySearch(int x)
{
  int p, q, i, L;

  p = 0;   /* Left border of the search  */
  q = N-1; /* Right border of the search */
  L = 0;   /* Comparison counter         */
  while (p <= q) {
    i = (p + q) / 2;
    ++L;
    if (A[i] == x) {
      printf("Found item i = %d"
        " in L = %d comparisons\n", i, L);
      return;
    }
    if (x < A[i])
      q = i - 1;
    else
      p = i + 1;
  }
}
```

Before `BinarySearch` was called, `N` was set to some integer number from 1 to 10000 inclusive and array `A` was filled with a nondescending integer sequence.

It is known that the procedure has terminated with the message "`Found item i = XXX in L = XXX comparisons`" with some known values of `i` and `L`.

Your task is to write a program that finds all possible values of `N` that could lead to such message. However, the number of possible values of `N` can be quite big. Thus, you are asked to group all consecutive `N`s into intervals and write down only first and last value in each interval.

Input

The input file consists of a single line with two integers `i` and `L` ($0 = i < 10000$ and $1 = L = 14$), separated by a space.

Output

On the first line of the output file write the single integer number K representing the total number of intervals for possible values of `N`. Then K lines shall follow listing those intervals in an ascending order. Each line shall contain two integers A_i and B_i ($A_i = B_i$) separated by a space, representing first and last value of the interval.

If there are no possible values of `N` exist, then the output file shall contain the single 0.

Sample input #1

```
9000 2
```

Sample input #2

```
10 3
```

Output for the sample input #1

```
0
```

Output for the sample input #2

```
4
12 12
17 18
29 30
87 94
```