2220 - Binary Search

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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 several datasets. Each datasets consists of a single line with two integers `i` and `L` ($0 \le i < 10000$ and $1 \le L \le 14$), separated by a space.

Output

On the first line of each dataset 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 ($A_i \leq B_i$) 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

```
10 3
```

Sample Output

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

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