Problem DERIVATIVES: Derivatives

Jeff recently joined an algebra working group that investigates algebraic rings of integers modulo N. An integer in this group is characterized by its remainder, which is left over after division by N.
Jeff has a special problem, where he needs to evaluate the derivatives of polynomials at the value 0 in the previously described ring. Derivatives are defined in the standard way, i.e., the first derivative of the term x^n is $n \cdot x^{n-1}$, the second derivative is $n(n-1) \cdot x^{n-2}$ and so on. A special property of the algebraic structure leads to the fact that the exponents of the terms are relatively large with respect to N. Each exponent is a non-negative integer greater or equal to $N - 1000$.
Jeff is not very good in programming and therefore he asks you to write a program to automatize his calculations. Please determine all non zero values of the derivatives of his polynomial for the input value 0.

Input

The first line contains two integers N and M where N determines the size of the ring ($1 \leq N \leq 2 \cdot 10^9$) and M represents the number of terms of Jeff's polynomial ($1 \leq M \leq 1000$). The following M lines contain two integers m_i and n_i ($0 < m_i < N, \max(0, N-1000) \leq n_i \leq 2 \cdot 10^9$). Each pair m_i and n_i describes a term of Jeff's polynomial. The i-th term is defined by $m_i \cdot x^{n_i}$. The exponents n_i are given in strictly increasing order.

Output

Print several lines of output. The first line should contain an integer K, the number of non zero values if the derivatives of Jeff's polynomial are evaluated at 0. Each of the following K lines should contain two integers d_i and f_i ($0 < f_i < N$). Each pair d_i and f_i should represent a non zero value of the derivative of Jeff's polynomial, i.e., the value of the d_i-th derivative evaluated with zero is f_i. The values d_i should be printed in strictly increasing order.

Explanation of the first sample case

Jeff's polynomial is $f(x) = 7 \cdot x^0 + 5 \cdot x^3$.
The 0-th derivative is equal to f and $f(0) = 7$. The first derivative ($15 \cdot x^2$) and the second derivative ($30 \cdot x^1$) evaluate to 0. The third derivative is equal to $30 \cdot x^0$ and its evaluation at 0 yields $30 \equiv 8 \mod 11$. The 4-th and all further derivatives are equal to zero and are therefore always evaluated to 0.

Sample Input 1

```
11 2
7 0
5 3
```

Sample Output 1

```
2
0 7
3 8
```

Sample Input 2

```
1999999973 4
3 1999999960
2 1999999965
1 1999999970
5 1999999975
```

Sample Output 2

```
3
1999999960 1272169057
1999999965 1367460299
1999999970 999999986
```