Sample Input

```
144
13
10
1
65535
999808
0
```

Output for Sample Input

```
       4    2
144 = 2  x 3

13 is a prime number

10 = 2 x 5

1 is just a one

65535 = 3 x 5 x 17 x 257

          7
999808 = 2  x 73 x 107
```

Comment: As you can see, exact formatting is important in this problem. Read the instructions carefully and follow them exactly. Otherwise, you will get a *presentation error*.





Random Generators

no files available yet

A *pseudorandom generator* is a function that produces sequence of seemingly random integers laying in some range $\langle a,b\rangle$ (where a and b are nonnegative integers). Given two pseudorandom generators, we want to combine them together. The easiest way is to take the values of the combined generator as xor of the values of the two input generators. The problem is to decide what is the range of possible values of the new generator, i.e., given two ranges $\langle a_1,b_1\rangle$ and $\langle a_2,b_2\rangle$, find the range $\langle a,b\rangle$ such that
$a = \min\{x_1 \text{xor} x_2 | a_1 \le x_1 \le b_1, a_2 \le x_2 \le b_2\}$ and
$b = \max\{x_1 \text{xor} x_2 | a_1 \le x_1 \le b_1, a_2 \le x_2 \le b_2\}$.

Input Specification

The input consists of several instances; input of each instance consists of a single line. This line contains four numbers a_1, b_1, a_2 and b_2 ($0 \le a_i \le b_i \le 10^9$), separated by single spaces. The value ranges of the two input generators are $\langle a_1,b_1\rangle$ and $\langle a_2,b_2\rangle$.

Output Specification