COCI '20 Contest 2 #3 Euklid

Time limit: 1.0s **Memory limit:** 512M

It is rarely mentioned that Euclid's grandma was from Vrsi in Croatia. It is from there that Euclid's less known (but equally talented in his youth) cousin Edicul* comes from.

It happened one day that they were playing "invent an algorithm". Edicul writes two positive integers on the sand. Then he does the following: while neither number on the sand is 1, he marks them as (a, b) so that $a \geq b$. Then the numbers are erased and he writes $(\lfloor \frac{a}{b} \rfloor, b)$ on the sand, and repeats the process. When one of the two numbers becomes 1, the other is the results of his algorithm.

Formally, if a and b are positive integers, the result $R(a, b)$ of Edicul's algorithm is:

$$R(a,b) = \begin{cases} R(b,a) & \text{if } a < b \\ R(\lfloor \frac{a}{b} \rfloor, b) & \text{if } a \geq b > 1 \\ a & \text{if } a \geq b = 1 \end{cases}$$

Euclid thinks for a while, and says: "Edicul, I have a better idea...", and the rest is history. Unfortunately, Edicul never became famous for his idea in number theory. This sad story inspires the following problem:

Given positive integers g and h, find positive integers a and b such that their **greatest common divisor** is g, and **the result of Edicul's algorithm** $R(a, b)$ is h.

* This sets up a pun in Croatian. The translation is a bit bland, sorry for that.

Input

The first line contains a single integer t $(1 \leq t \leq 40)$ – the number of independent test cases.

Each of the following t lines contains two positive integers g_i and h_i $(h_i \geq 2)$.

Output

Output t lines in total. For the i-th test case, output positive integers a_i and b_i such that $\gcd(a_i, b_i) = g_i$ and $R(a_i, b_i) = h_i$.

The numbers in the output must not be larger than 10^{18}. It can be proven that for the given constraints, a solution always exists.

If there are multiple solutions for some test case, output any of them.

Scoring

In all subtasks, $1 \leq g \leq 200\,000$ and $2 \leq h \leq 200\,000$.

Subtask	Score	Constraints
1	4	$g = h$
2	8	$h = 2$
3	8	$g = h^2$
4	15	$g, h \leq 20$
5	40	$g, h \leq 2\,000$
6	35	No additional constraints.

Sample Input 1

```
1
1 4
```

Sample Output 1

```
99 23
```

Explanation for Sample Output 1

The integers 99 and 23 are coprime, i.e. their greatest common divisor is 1. We have $\lfloor \frac{99}{23} \rfloor = 4$, thus $R(99, 23) = R(4, 23) = R(23, 4)$. Then $\lfloor \frac{23}{4} \rfloor = 5$, so $R(23, 4) = R(5, 4) = R(1, 4) = R(4, 1) = 4$.

Sample Input 2

```
2
3 2
5 5
```

Sample Output 2

```
9 39
5 5
```

Explanation for Sample Output 2

For the first test case, $\gcd(9, 39) = 3$ and $R(9, 39) = 2$.

For the second test case, $\gcd(5, 5) = 5$ and $R(5, 5) = 5$.