

Square-free Integers Factorization

Given the positive integers $N = p_1 * p_2 * \dots * p_k$ and $M = (p_1-1) * (p_2-1) * \dots * (p_k-1)$, i.e $M = \varphi(N)$ (Euler's totient function), where $k \geq 1$, $p_i \neq p_j$ for all $i \neq j$ with $i, j = 1, 2, \dots, k$ and p_i is prime number for all $i = 1, 2, \dots, k$, your task is factor n.

Input

The first line contains a positive integer T, the number of test cases, where $T \leq 100$. The following T lines each contains two numbers N and M in this order, where $N < 10^{100}$.

Output

Output T lines, with prime factorization of N according with example.

Example

Input:

```
3
210 48
983 982
14351 14112
```

Output:

```
210 = 2 * 3 * 5 * 7
983 = 983
14351 = 113 * 127
```