DWITE '11 R4 #2 - Prime Time

Time limit: 2.0s   **Memory limit:** 64M

DWITE, January 2012, Problem 2

For your math homework this week, your teacher gave you five large numbers, and asked you to find their prime factors. However, these numbers aren't *nearly* large enough for someone with knowledge of programming like yourself. So, you decide to take the factorial of each of these numbers. Recall that $N!$ (N factorial) is the product of the integers from 1 through N. It's your job now to create a program to help you do your homework.

The input will contain 5 test cases. Each test case contains a number N $(2 \le N \le 10\,000)$.

The output will contain 5 lines of output, each representing the prime factorization of the given number, which should be of the form: $p_1^{e_1} \times p_2^{e_2} \times \cdots \times p_k^{e_k}$ where $p_1, p_2, \ldots, p_k$ are the distinct prime factors of the given number in increasing order, and $e_1, e_2, \ldots, e_k$ are their exponents.

Sample Input

```
2
3
5
10
20
```

Sample Output

```
2^1
2^1 * 3^1
2^3 * 3^1 * 5^1
2^8 * 3^4 * 5^2 * 7^1
2^18 * 3^8 * 5^4 * 7^2 * 11^1 * 13^1 * 17^1 * 19^1
```