# Project Euler #170: Find the largest 0 to 9 pandigital that can be formed by concatenating products.

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This problem is a programming version of Problem 170 from projecteuler.net

Take the number $6$ and multiply it by each of $1273$ and $9854$:

$6 \times 1273 = 7638$
$6 \times 9854 = 59124$

By concatenating these products we get the $1$ to $9$ pandigital $763859124$. We will call $763859124$ the "concatenated product of $6$ and $(1273,9854)$". Notice too, that the concatenation of the input numbers, $612739854$, is also $1$ to $9$ pandigital.

The same can be done for $0$ to $9$ pandigital numbers.

What is the largest $0$ to $9$ pandigital $10$-digit concatenated product of a positive integer with two or more other positive integers (all integers without leading zeroes), such that the concatenation of the input numbers is also a $0$ to $9$ pandigital $10$-digit number and the concatenated product is not greater than $N$?

**Input Format**

The first line of input contains a single integer $T$ which is the number of test cases. Each of the $T$ lines contain a single integer $N_i$.

**Constraints**

- $1 \leq T \leq 200000$
- $N_i$ is $0$ to $9$ pandigital number without leading zeroes.

**Output Format**

For each $N_i$ from input, output the multiplications which produce the maximum pandigital product. Answer always exists but if there are several sets of these multiplications, choose the one with the best representation. Definition of the best representation is as follows:

1. Let's assume that the maximum pandigital can be represented as a product of $a_1$ and $(b_{11}, b_{12}, \dots b_{1m_1})$. Also it can be represented as a product of $a_2$ and $(b_{21}, b_{22}, \dots b_{2m_2})$. Notice that $a_i$ and $b_{ij}$ are positive and have no leading zeroes $\forall i, j$.

2. If $m_1 \neq m_2$, then the best representation is the one with the least $m$. Otherwise, look $(3)$.

3. If $a_1 \neq a_2$, then the best representation is the one with the least $a$. Otherwise, look $(4)$.
4. If for some $j, 1 \leq j \leq m_1$ the following is true: $b_{1i} = b_{2i} \; \forall i < j$ and $b_{1j} \neq b_{2j}$ then the first representation is the best if and only if $b_{1j} < b_{2j}$.

Output should match the following pattern:

```
a*(b_1,b_2,b_3...)=P
```

Refer sample for further clarification.

**Sample Input 0**

```
1
2840571693
```

**Sample Output 0**

```
3*(94658,2170)=2839746510
```

**Explanation 0**

As one can notice, $3 \times 94658 = 283974$ and $3 \times 2170 = 6510$