

# Increasing Powers of K

Let's define  $S_k$  as the increasing sequence  $a_1, a_2, a_3, \dots$  consisting of all those positive integers which are powers of  $K$  or sums of distinct powers of  $K$ .

For example  $S_3 = \{1, 3, 4, 9, 10, 12, 13, 27, 28, 30, \dots\}$

Your task is given  $N$  and  $K$  find the  $N^{\text{th}}$  term of the sequence  $S_k$ .

## Input

The first line of the input contains a single integer  $T$  ( $1 \leq T \leq 10^4$ ) representing the number of test cases. The next  $T$  lines consist of two numbers each one separated by a single space:

$K$  ( $3 \leq K \leq 9$ ) and  $N$  ( $1 \leq N \leq 10^{200}$ ).

## Output

For each test case print a single line, the  $N^{\text{th}}$  term of the sequence  $S_k$ .

## Example

### Input:

```
8
3 4
3 100
4 3
5 12
6 7
7 239
8 17
9 500
```

### Output:

```
9
981
5
150
43
958399
4097
48426822
```