Problem A. Integeregex

Small input 15 points	Solve A-small
Large input 15 points	Solve A-large

Problem

In this problem, a valid regular expression is one of the following. In the following descriptions, E_1, E_2, etc. denote (not necessarily different) valid regular expressions.

- A decimal digit: that is, one of `0 1 2 3 4 5 6 7 8 9`.
- Concatenation: E_1E_2.
- Disjunction: $(E_1|E_2|...|E_N)$, for at least two expressions. Note that the outer parentheses are required.
- Repetition: $(E_1)*$. Note that the outer parentheses are required.

For example, `7`, `23`, `(7)*`, `(45)*`, `(1|2|3)`, `((2)*|3)`, `(1|2|3)`, and `((0|1))*` are valid expressions. `(7)`, `4|5`, `4*`, `(1|)`, and `(0|1)*` are not.

We say that an expression E matches a string of digits D if and only if at least one of the following is true:

- $E = D$.
- $E = E_1E_2$ and there exist D_1 and D_2 such that $D = D_1D_2$ and E_i matches D_i.
- $E = (E_1|E_2|...|E_N)$ and at least one of the E_i matches D.
- $E = (E_1)*$ and there exist D_1, D_2, ..., D_N for some non-negative integer N such that $D = D_1D_2...D_N$ and E_1 matches each of the D_i. In particular, note that $(E_1)*$ matches the empty string.

For example, the expression `((1|2))*3` matches 3, 13, 123, and 2221123, among other strings. However, it does *not* match 1234, 3123, 12, or 33, among other strings.

Given a valid regular expression **R**, for how many integers between **A** and **B**, inclusive, does **R** match the integer's base 10 representation (with no leading zeroes)?

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow; each consists of two lines. The first line has two positive integers **A** and **B**: the inclusive limits of the integer range we are interested in. The second has a string **R** consisting only of characters in the set `0123456789()|*`, which is guaranteed to be a valid regular expression as described in the statement above.

Output

For each test case, output one line containing `Case #x: y`, where x is the test case number (starting from 1) and y is the number of integers in the inclusive range [**A**, **B**] that the the regular expression **R** matches.

Limits

$1 \le \mathbf{T} \le 100$.
$1 \le \mathbf{A} \le \mathbf{B} \le 10^{18}$.
$1 \le$ length of $\mathbf{R} \le 30$.

Small dataset

R contains no | characters.

Large dataset

No additional limits.

Sample

Input	Output
8 1 1000	Case #1: 4 Case #2: 1

```
(0)*1(0)*                   Case #3: 5
379009 379009               Case #4: 0
379009                      Case #5: 4
1 10000                     Case #6: 2
(12)*(34)*                  Case #7: 1000000000000000000
4 5                         Case #8: 6
45
1 100
((0|1))*
1 50
(01|23|45|67|23)
1 1000000000000000000
((0|1|2|3|4|5|6|7|8|9))*
1 1000
1(56|(((7|8))*9)*)
```

Note that sample cases 5 through 8 would not appear in the Small dataset.

In sample case 1, the matches in range are 1, 10, 100, and 1000.

In sample case 2, the match in range is 379009.

In sample case 3, the matches in range are 12, 34, 1212, 1234, and 3434.

In sample case 4, there are no matches in range.

In sample case 5, the matches in range are 1, 10, 11, and 100.

In sample case 6, the matches in range are 23 and 45.

In sample case 7, it is possible to form any number in the range.

In sample case 8, the matches in range are 1, 19, 156, 179, 189, and 199.
