Problem 5: Echoed Voice
3+4 Points

Problem ID: `decibel`
Rank: `2+2`

Introduction

When Decibel and Taka were platonically exploring a cave together, they realized that anything they said would echo back louder.

Problem Statement

Given a lowercase string $\mathbf{S}$, we apply an operation to turn it into that string BUT LOUDER. This means converting any lowercase letter into an uppercase letter, and adding a lowercase copy of a letter after each (pre-conversion) uppercase letter. For example, `a` becomes `A`, and `A` becomes `Aa`.

The **score** of a character is 1–26 for letters `a`–`z`, and 27–52 for letters `A`–`Z`, respectively. The score of a string is the sum of the scores of all characters in the string.

Find the score of $\mathbf{S}$ after making the string LOUDER $\mathbf{K}$ times. For the main test set, this score is **guaranteed** to fit in a 32-bit integer. For the bonus test set, please express this value modulo **998244353**.

Input Format

The first line contains an integer $\mathbf{T}$ denoting the number of test cases that follow.

Each test case is one line containing a string of lowercase letters $\mathbf{S}$ followed by a space and an integer $\mathbf{K}$, as defined in the problem statement.

Output Format

Find the score, as defined above, of string $\mathbf{S}$ after making the string LOUDER $\mathbf{K}$ times.

Constraints

$1 \leq \mathbf{T} \leq 10$

Main Test Set

$1 \leq |\mathbf{S}| \leq 10$

$1 \leq \mathbf{K} \leq 15$

Bonus Test Set

$1 \leq |\mathbf{S}| \leq 10^4$

$1 \leq \mathbf{K} \leq 10^4$

Sample Test Cases

Main Sample Input

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```
3
aa 2
abab 1
AaBBaBAab 5
```

Main Sample Output

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```
56
110
1704
```

Main Sample Explanations

For the first test case, `aa` $\rightarrow$ `AA` $\rightarrow$ `AaAa`. This gives us a score of $27 + 1 + 27 + 1 = 56$.

For the second test case, `abab` $\rightarrow$ `ABAB`. This gives us a score of $27 + 28 + 27 + 28 = 110$.

For the third test case, the resulting string will have 31 uppercase `A`'s, 29 uppercase `B`'s, 19 lowercase `a`'s, and 18 lowercase `b`'s. This gives us a score of $27 \cdot 31 + 28 \cdot 29 + 1 \cdot 19 + 2 \cdot 18 = 1704$.