



# Virus RNA

Input: Standard Input  
Output: Standard Output



The whole world has become worried about the rapid spread of a virus. Scientists need to understand the folding of RNA of that virus so that they can have more information about its structure.

The basic RNA-folding problem is defined by a string **S** of length **n** over the four-letter alphabet **{A, U, C, G}**, and an integer **d** (distance parameter). Each letter in this alphabet represents an **RNA** nucleotide. Nucleotides **A** and **U** are called **complimentary** as are the nucleotides **C** and **G**. A matching consists of a set **M** of disjoint pairs of positions of **S**, i.e. in a set **M** no position **i** can be paired with two different positions **j** and **j'**. If pair **(i, j)** is in **M**, then the nucleotide at **i-th** position is said to match the nucleotide at position **j**. A match is a **permitted match** if the nucleotides at sites **i** and **j** are complimentary, **i < j** and **|i - j| > d**. A matching **M** is non-crossing if and only if it does not contain any four sites **i < i' < j < j'** where **(i, j)** and **(i', j')** are matches in **M**. Finally, a permitted matching **M** is a matching that is non-crossing, where each match in **M** is a permitted match. The basic **RNA-folding** problem is to find a permitted matching of maximum cardinality.

In this problem, you need to find the maximum cardinality of a permitted matching and the number of different sets **M** of that maximum cardinality. A set **M** is different from another set **M'** if there exists at least one pair **(i, j)** in **M** and **(i', j')** in **M'** such that either **i and i'** or **j and j'** are different.

## Input

The first line of input file contains the number of test cases, **T** (**1 ≤ T ≤ 80**). Then **T** cases follow:

Each case consists of two lines. The first line contains one integer: **d** (**0 ≤ d ≤ |S|**). Then the second line contains the string **S** (**1 ≤ |S| ≤ 250**). It will contain only the uppercase characters **{A, U, C, G}**.

## Output

For each case, print "**Case <x>: <y z>**" in a separate line, where **x** is the case number, **y** is the maximum cardinality and **z** is the number of sets with maximum cardinality. As the value of **z** can be very large, print **z modulo 10007**.

## Sample Input

## Output for Sample Input

2	Case 1: 0 1
1	Case 2: 4 1
AUA	
4	
GGACCUUUUGGACGC	

### Explanation of Sample cases

For 1<sup>st</sup> case, there is no pair of positions which satisfies the conditions of permitted match, i.e. empty set is the only possible answer.

For 2<sup>nd</sup> case, the matches are shown below where the first position of a pair is denoted by '(' and the other position is denoted by ')':

GGACCUUUUGGACGC  
( ( ( ( . . . ) ) ) ) )

This is the only possible set with 4 permitted matches: **{(1, 15), (2, 13), (4, 11), (5, 10)}**.