



# Combo

You are playing an action video game. The game controller has 4 buttons, A, B, X, and Y. In this game, you can get coins with combo moves. You can make a combo move by pressing buttons in sequence.

This game has a secret sequence of buttons, which can be represented as a string  $S$  of those 4 characters. You don't know the string  $S$ , but you know its length  $N$ .

**You also know that the first character of  $S$  never reappears in it.** For example,  $S$  can be "ABXYY" or "XYAA", but cannot be "AAAAA" or "BXYBX".

You can press a sequence of up to  $4N$  buttons for a combo move. Let  $p$  be the string which represents the sequence of the buttons you pressed. The number of coins you get for this move is calculated as the length of the longest prefix of  $S$  which is also a substring of  $p$ . A substring of a string  $t$  is a contiguous (possibly empty) sequence of characters within  $t$ . A prefix of  $t$  is a substring of  $t$  that is empty or contains the first character of  $t$ .

For example, if  $S$  is "ABXYY" and  $p$  is "XXYYABYABXAY", you will get 3 coins because "ABX" is the longest prefix of  $S$  that is also a substring of  $p$ .

Your task is to determine the secret string  $S$  using few combo moves.

## Implementation details

You should implement the following function:

```
string guess_sequence(int N)
```

- $N$ : the length of string  $S$ .
- This function is called exactly once for each test case.
- This function should return the string  $S$ .

Your program can call the following function:

```
int press(string p)
```

- $p$ : a sequence of buttons you press.
- $p$  must be a string of length between 0 and  $4N$ , inclusive. Each character of  $p$

must be A, B, X, or Y.

- You cannot call this function more than 8 000 times for each test case.
- This function returns the number of coins you get when you press the sequence of buttons represented by  $p$ .

If some of the above conditions are not satisfied, your program is judged as **Wrong Answer**. Otherwise, your program is judged as **Accepted** and your score is calculated by the number of calls to `press` (see Subtasks).

## Example

Let  $S$  be "ABXY". The grader calls `guess_sequence(5)`. An example of communication is shown below.

Call	Return
<code>press("XXYYABYABXAY")</code>	3
<code>press("ABXY")</code>	5
<code>press("ABXYABXY")</code>	5
<code>press("")</code>	0
<code>press("X")</code>	0
<code>press("BXY")</code>	0
<code>press("YYXBA")</code>	1
<code>press("AY")</code>	1

For the first call to `press`, "ABX" appears in "XXYYABYABXAY" as a substring but "ABXY" does not, so 3 is returned.

For the third call to `press`, "ABXY" itself appears in "ABXYABXY" as a substring, so 5 is returned.

For the sixth call to `press`, no prefix of "ABXY" but the empty string appears in "BXY" as a substring, so 0 is returned.

Finally, `guess_sequence(5)` should return "ABXY".

The file `sample-01-in.txt` in the zipped attachment package corresponds to this example.

## Constraints

- $1 \leq N \leq 2000$
- Each character of the string  $S$  is A, B, X, or Y.

- The first character of  $S$  never reappears in  $S$ .

In this problem, the grader is NOT adaptive. This means that  $S$  is fixed at the beginning of the running of the grader and it does not depend on the queries asked by your solution.

## Subtasks

1. (5 points)  $N = 3$
2. (95 points) No additional constraints. For this subtask, your score for each test case is calculated as follows. Let  $q$  be the number of calls to press.
  - If  $q \leq N + 2$ , your score is 95.
  - If  $N + 2 < q \leq N + 10$ , your score is  $95 - 3(q - N - 2)$ .
  - If  $N + 10 < q \leq 2N + 1$ , your score is 25.
  - If  $\max\{N + 10, 2N + 1\} < q \leq 4N$ , your score is 5.
  - Otherwise, your score is 0.

Note that your score for each subtask is the minimum of the scores for the test cases in the subtask.

## Sample grader

The sample grader reads the input in the following format:

- line 1:  $S$

If your program is judged as **Accepted**, the sample grader prints Accepted:  $q$  with  $q$  being the number of calls to the function press.

If your program is judged as **Wrong Answer**, it prints Wrong Answer: MSG. The meaning of MSG is as follows:

- **invalid press**: A value of  $p$  given to press is invalid. Namely, the length of  $p$  is not between 0 and  $4N$ , inclusive, or some character of  $p$  is not A, B, X, or Y.
- **too many moves**: The function press is called more than 8 000 times.
- **wrong guess**: The return value of guess\_sequence is not  $S$ .