服務市民 SERVING THE COMMUNITY

Open Date 22 MAY 2022 Knowledge Management
Reg Date 20 MAR 2023 Reg ID: CS/KS/02 Type: Implementation

Topic: Google Kick Start Round C 2022
"New Password"

Discipline of Learning:
- Computer Science
- Programming (II) (in Python 3)
- String Operation

Content:
* This kind of "Knowledge" registrations will merge into the sub-directory.

In this question, participants should create a new password (a set of String) that fulfilling the specified requirements attached in the question paper.

The solution is very simple, you just need to add the leading 'character' after the String the user provided, and add the 'length - number of added leading characters' remaining character at the rear of the String.

Following the 'special character rule' (such as capitalizations, special characters, and numbers) at first, then the 'length' rule at secondary.

Here is an example:

Step	Step Requirement	Current Password
1	Adding UPPER case of alphabet letter	A
2	Adding LOWER Case of alphabet letter	Aa
3	Adding one digit	Aa1
4	Adding Special letter, only include #@*&	Aa1#
5	Password contains at least 7 characters	Aa1#

Users will input the quantities of the test case and their chosen password. Test case will run servals times to meet above steps.

Sample · Conditional + PASS
Task 1 ④ / 4 pts PASS
Task 2 ⑥ / 6 pts PASS
Total ⑩ / 10 pts

Round C 2022 - Kick Start 2022

New Password

22 MAY 2022

Problem

A company named Gooli has issued a new policy that their employees account passwords must contain:

1. At least 7 characters.
2. At least one uppercase English alphabet letter.
3. At least one lowercase English alphabet letter.
4. At least one digit.
5. At least one special character. There are four special characters: #, @, *, and &.

The company has asked all the employees to change their passwords if the above requirements are not satisfied. Charles, an employee at Gooli, really likes his old password. In case his old password does not satisfy the above requirements, Charles will fix it by appending letters, digits, and special characters. Can you help Charles to find the shortest possible new password that satisfies his company's requirements?

Input

The first line of the input gives the number of test cases, T. T test cases follow. Each test case consists of two lines. The first line of each test case contains an integer N, denoting the length of the old password. The second line of each test case contains the old password of length N. Old password contains only digits, letters, and special characters.

Output

For each test case, output one line containing `Case #xx: yy`, where `xx` is the test case number (starting from 1) and `yy` is a valid new password, obtained by possibly fixing the old password in the way that Charles wants and satisfying the company's requirements.

It is guaranteed that at least one solution exists. If there are multiple solutions, you may output any one of them.

Limits

Time limit: 20 seconds.
Memory limit: 1 GB.
$1 \leq T \leq 100$ 1≤T≤100.

Test Set 1

$7 \leq N \leq 10^4$ 7≤N≤104.
The old password contains only digits.

Test Set 2

$1 \leq N \leq 10^4$ 1≤N≤104.
The old password contains only digits, letters, and special characters.

Sample

Note: there are additional samples that are not run on submissions down below.

Sample Input (save_alt content_copy)

```
2
7
1234567
10
1111234567
```

Sample Output (save_alt content_copy)

```
Case #1: 1234567aA&
Case #2: 1111234567@Rc
```

In Sample Case #1, the old password does not satisfy requirements 2, 3, and 5. One possible shortest new password is `1234567aA&`.

In Sample Case #2, the old password does not satisfy requirements 2, 3, and 5. One possible shortest new password is `1111234567@Rc`.

Additional Sample - Test Set 2

The following additional sample fits the limits of Test Set 2. It will not be run against your submitted solutions.

Sample Input (save_alt content_copy)

```
3
1
A
2
1*
7
1234aB&
```

Sample Output (save_alt content_copy)

```
Case #1: Aa1*111
Case #2: 1*abAA*
Case #3: 1234aB&
```

In Sample Case #1, the old password does not satisfy requirements 1, 3, 4, and 5. One possible shortest new password is `Aa1*111`.

In Sample Case #2, the old password does not satisfy requirements 1, 2, and 3. One possible shortest new password is `1*abAA*`.

In Sample Case #3, the old password already meets all the requirements so Charles does not have to change his password.