Problem 8: Pa$$w0rd

Difficulty: Medium

Author: Brett Reynolds, Orlando, Florida, United States

Problem Background

Passwords are commonplace, but what isn't so commonplace are good passwords. Every year, security experts go through leaked passwords to try and identify the most commonly used passwords, and some of them are, quite frankly, embarrassing. The ten most commonly used passwords in 2019 were:

1. 123456
2. 123456789
3. qwerty
4. password
5. 111111
6. 12345678
7. abc123
8. 1234567
9. password1
10. 12345

Also common were names ("Ashley", "Michael"), sports teams ("manutd", "cowboys1"), and common words and phrases ("dragon", "iloveyou"). All of these are terrible passwords, because they're easy to guess or form common sequences ("qwerty" is the first six letters on the top row of a standard United States keyboard).

Many websites and other services try to protect their users from their own security ignorance by enforcing rules on passwords. Typically, these require certain lengths, or require the use of certain characters. More advanced systems may also deny the use of repeating characters or common words or sequences.

Problem Description

You're working for Lockheed Martin's Security division, and it's been decided that new password rules need to be implemented for all Lockheed Martin employees. If an employee's password doesn't meet some minimum standards, they will receive an email directing them to change their password within two weeks, or have their account disabled.

Your management team has decided upon these rules for passwords (quick security disclaimer: these are not the actual rules currently used at Lockheed Martin):

1. Passwords must contain at least 8 characters.

2. Passwords must contain at least one character from at least three of the following groups:
    a. Uppercase English letters (A, B, C, ..., Y, Z)
    b. Lowercase English letters (a, b, c, ..., y, z)
    c. Numbers (1, 2, 3, ... 9, 0)
    d. Non-alphanumeric characters (!, @, #, $, etc.)
3. Passwords may not repeat the same character more than twice in a row.

Your task is to write a program that evaluates passwords stored in Lockheed Martin's system and determines if they are valid or not. Failure to meet even one of the rules listed above renders a password invalid.

Sample Input

The first line of your program's input, received from the standard input channel, will contain a positive integer representing the number of test cases. Each test case will include a single line consisting of one or more ASCII characters, representing a password.

```
4
Passw0rd
Password
Pa$$$w0rd
P$w0rd
```

Sample Output

For each test case, your program must print a line containing the word VALID if the given password meets all three of the given rules or INVALID if it does not.

```
VALID
INVALID
INVALID
INVALID
```