BACS2023 Object-Oriented Programming

Practical 5: Classes for Processing Strings

Q1. Write a method that finds the number of occurrences of a specified character in a string using the following header:

```
public static int countLetter(String str, char ch)
```

Write a test program that prompts the user to enter a word and a letter of the alphabet. The program should then count and display the number of occurrences of the letter in the word. A sample dialog for the program is shown below:

```
Enter a word: happy
Enter the letter you want to count: p
happy contains 2p
```

Q2. Write a program that prompts the user to enter a string and then displays the string modified as follows:

- Convert all the characters in the string to uppercase
- Replace all the vowels with the lowercase letter `'x'`

Here is a sample run of the program:

```
Enter a string: The quick brown fox jumps over the lazy dog
Modified string: THx QxxCK BRxWN FxX JxMPS xVxR THx LxZY DxG
```

Q3. Some Websites impose certain rules for passwords. Write a method that checks whether a string is a valid password. Suppose the password rule is as follows:

- A password must have at least 7 characters.
- A password consists of only letters and digits.
- A password must contain at least one letter and at least one digit.

Write a program that prompts the user to enter a password and displays `"Valid Password"` if the rule is followed or `"Invalid Password"` otherwise.

Q4. Consider the following partial UML class diagram for the class **`Student`**:

Student
-studentID: String -name: String -school: String
+validateStudentID(s: Student):boolean

`studentID` is a string that consists of a letter representing the school followed by 5 digits. The codes used for the schools in this scenario are shown below:

School	Code	Example of student ID
FASC	'A'	"A12345" refers to a student from FASC.
FAFB	'B'	"B88888" refers to a student from FAFB.

Write the code for the method **`validateStudentID(Student student)`** such that it performs validations on the parameter's student ID to ensure that:

- the format is correct (*i.e.* the student ID consists of a letter followed by 5 digits) and
- the letter value corresponds to the student's school.

Q5. Write a program that accepts a person name as a command line argument. The program must correct the capitalization of the name, extract the surname and display 2 lines of text. The first letter of each word must be a capital letter while the rest of the word should be lower case letters.

A sample run of the program is shown below:

```
C:\java Q5 pETER [RYAN] Robbin Mr

To: Peter Ryan Robbin
Wishing you a Merry Christmas, Mr Ryan.

C:\java Q5 JOHN [SMITH] Mr

To: John Smith
Wishing you a Merry Christmas, Mr Smith.

C:\java Q5 [Chee] ky li Ms

To: Chee Ky Li
Wishing you a Merry Christmas, Ms Chee.
```

[Adapted from eGenting Programming Competition 2014]