# CS-UY 1114: Lab 7

# Strings

You must get checked out by your lab CA **prior to leaving early.** If you leave without being checked out, you will receive 0 credits for the lab.

## Restrictions

The Python structures that you use in this lab should be restricted to those you have learned in lecture so far. Please check with your teaching assistants in case you are unsure whether something is or is not allowed!

***Create a new python file for each of the following problems.***

**Your files should be named** *lab[num]_q[num].py* **similar to homework naming conventions.**

**Note:** This lab includes both a series of string questions and a practice midterm that we will cover solutions to at the end.

## Problem 1: *History with Strings*

*Solve this problem by hand on paper*

1. Given the assignment statement below, write expressions that evaluate to the specified strings. For example, given the assignment statement below, the Python expression name[0] evaluates to "G".

   ```
   name = "Grace Hopper"
   ```

   - Write an expression whose value is "r".
   - Write an expression using the function len whose value is "r".
   - Write an expression whose value is "Grace". Use the slicing operator.

2. Given the assignment statement below, write expressions that evaluate to the specified strings. Use the slicing operator.

   ```
   name = "alan turing"
   ```

   - "Alan"
   - "Turing"

3. Given the following use a combination of slicing and concatenation to write expressions that evaluate to the specified strings.

   ```
   S = "Computer Science"
   ```

   - "Cmue cec"
   - "Comp Sci"

4. Given the following use a combination of slicing and concatenation to write expressions that evaluate to the specified strings.

```
place = "Bletchley Park, England"
```

- "England"
- "yelhctelB"

# Problem 2A: *Reverse It Slicing*

**Note:** You may not reverse the string for this problem through the `.reverse()` method

Write a program that will take an input from the user and reverse it. In this version of the problem, reverse the string using string slicing. This is a quick and straightforward problem that focuses on indexing with strings.

Here are some sample executions of the program:

```
Enter your phrase: hello
olleh
```

```
Enter your phrase: CS 1114
4111 SC
```

# Problem 2B: *Reverse It Looping*

Implement 2A again except this time, reverse the string using a loop instead of string slicing

```
Enter your phrase: hello
olleh
```

```
Enter your phrase: CS 1114
4111 SC
```

# Problem 3: Counting Vowels

Given a user message, count the number of vowels present in the message and display this total. The total count should be case insensitive (meaning both lowercase and uppercase vowels may contribute to the total). You may not use the `==` operator.

Here are some example outputs:

```
Please enter your message: the qUick brown fox jumps over the lAzy dog
Total number of vowels: 11
```

```
Please enter your message: Office hours is pretty cool
Total number of vowels: 9
```

*Hint:* Think how you can use the `in` operator

## Problem 4: *Hamming Distance*

In computer science, it is useful to be able to quantify the difference between two strings. One approach is called the Hamming distance. To find the Hamming distance, count the number of positions at which the corresponding characters differ between two strings. Hamming distance requires that the strings be of equal length.

For example: The Hamming distance between `"cat"` and `"cat"` because the strings contain the same characters at all index positions.

The Hamming distance between `"cat"` and `"car"` is 1 because there is one index position at which the strings differ (index position 2). At index positions 0 and 1, the strings contain the same characters.

Here are a couple more examples:

```
"cat" and "pot" Hamming distance is 2
"cat" and "dog" Hamming distance is 3
```

Write a program which the Hamming distance between str1 and str2 both entered by the user. You may assume that the user enters strings of equal length.

**Hint:** You need to find a way to compare the strings character by character.

## Problem 5: *It's A Secret...*

Write a program that takes as input a line of text and outputs a new line of text with the digits of the integer numbers replaced by the character x.

Below is a sample output of the program:

```
Enter a phrase: My userID is john17 and my 4 digit pin is 1234 which is secret
My userID is john17 and my x digit pin is xxxx which is secret
```

Notice that the digits in the username `john17` were **not** changed to x. If the digit is part of a word, it should **NOT** be changed. You may assume that the text entered by the user will contain only letters, digits and may also assume that there is exactly one space between each word in the line of text.

**Hint:** One approach to solving this problem is to use the slicing operator to isolate each word in the line. In order to do this, you will need to know the index position at which the word starts and ends. You can use the space character `" "` as an indicator of separation between words. You will need to iterate over the string and check if you encounter the space character `" "`. You will also need to store the index of the previous space

you encountered so that when you encounter a new space, you will know what indices of the original input correspond to the start and end of a word. Note that you will need to account for the last word in a string differently.

Once the words are isolated the problem is more straightforward consider using the `isdigit()` method to your advantage.

## Problem 6: Secret Message Decoder

You receive an encoded message from the user where some words of their message are capitalized. Putting together the first letter in each capitalized word spells out a secret message.

Create a program that accepts user input, decodes the message according to the algorithm described above, and displays the secret message. You may assume there is always a single whitespace `" "` between words.

Here are some example outputs:

```
Please enter your message:
Originally, the Green goBlin Rested in HiS forest for maNY Eras
Your secret message is: OGRE
```

```
Please enter your message:
bob went Out oF Office so he cAn Get SOme Apples
Your secret message is: OOGA
```