Programming and Scripting
Lab Topic 03-Variables and State

Introduction.

I would suggest that you create a folder called labs and a subdirectory Topic03-variables, in the directory you push up to GitHub.
You can save the programs you create in this lab in there.

Strings and Numbers:

1. Write a program (lab03.01-hello.py) that reads in a persons name and uses the format function with strings to output "Hello *thename*".

```
Enter your name: Andrew
Hello Andrew
```

Answer

```
# Program that reads in a persons name and
# outputs hello thatName

name = input("Enter your name: ")
print("Hello {}".format(name))
```

2. Write a program (lab03.2-sub.py) that reads in two numbers and subracts the first one from the second one. The program you print out "the difference is ***123***", where 123 is the difference between the numbers.

```
Enter first number: 10
Enter second number: 4
10 minus 4 is 6
```

Answer

```
# Program to subtract on number from another.

# input reads in a string so we need to convert it into an int
# so we can perform mathematical operations

x = int(input("Enter first number: "))
y = int(input("Enter second number: "))
answer= x-y
print("{} minus {} is {} ".format(x, y, answer))
```

3. Write a program (lab03.03-div.py) that reads in two numbers and divides the first one by the second and give the integer result and the remainder.

```
Enter first number: 10
Enter the number you want to divide by: 3
10 divided by 3 is 3 with remainder 1
```

Answer

```
# program that reads in two numbers and
# outputs the integer answer and remainder

x = int(input("Enter first number: "))
y = int(input("Enter the number you want to divide by: "))
answer = int(x/y)
remainder = x%y

print("{} divided by {} is {} with remainder {}".format( x, y,
answer, remainder))
```

4. Write a program (lab03.04-random.py) that prints out a random number between 1 and 10. You will need to import the module random.

```
# program that prints out a random number between 1 and 10

import random

number = random.randint(1,10)
print("here is a random number {}".format(number))
```

Extra try modifying the program so that the user inputs the range
(more information on the random module can be found here

5. Write a program (lab03.05-normalise.py) that reads in a string and strips any leading or trailing spaces, the program should also convert the string to lower case. The program should also output the length of the input and output strings

> Please enter a string: Some StRiNg
> That String normalised is :some string
> we reduced the input string from 57 to 11 characters

Answer

```
# This program reads in a string and strips
# any leading or trailing spaces.
# It also converts all the letters to lower case
# this program also outputs the lenght of the original string
# and the normalised one

rawString = input("please enter a string:")
normalisedString = rawString.strip().lower()

lenghtOfRawString = len(rawString)
lenghtOfNormalised = len(normalisedString)

print("That String normalised is :{}".format(normalisedString))
print("we reduced the input string from {} to {} characters".format(
lenghtOfRawString, lenghtOfNormalised ))
```

Lists and tuples

6. Write a program (lab03.06-randomfruit.py) that prints out a random fruit

```
> python .\lab03.07-randomfruit2.py
A Random Fruit:Banana
> python .\lab03.07-randomfruit.py
A Random Fruit:Apple
```

Answer

```
# This program prints out a random fruit

import random

fruits = ['Apple', 'Orange', 'Banana', 'Pear']

# we want a random number between 0 and lenght-1
index = random.randint(0,len(fruits)-1)

fruit = fruits[index]
print("A Random Fruit:{}".format(fruit))
```

There is a neater way of doing this, the random module can pick a random choice from a list.
And for this example we should have used a tuple, because we don't change the list

7. Modify the program in 6 (lab03.07-randomFruit2.py) so that it uses a tuple not a list

```
# This program prints out a random fruit

import random

fruits = ('Apple', 'Orange', 'Banana', 'Pear')

# we want a random number between 0 and lenght-1
index = random.randint(0,len(fruits)-1)

fruit = fruits[index]
print("A Random Fruit:{}".format(fruit))
```

Dictionaries

8. Create an Dictionary Object called currentBook that has three attributes:
   - Title
   - author
   - price

   As an exercise
   - Print out the dictionary object
   - Print just the author of the currentBook
   - Create a new attribute called ISBN (with some value)
   - Print out all the values in the currentBook (using for loop)

   Answer

```
currentBook = {
    "title" : "Harry Potter eats his dinner",
    "author": "Just Kidding Rowling",
    "price" : 12
}
#print dictionary object
print (currentBook)

# print just the author
print (currentBook["author"])

# create and set attribute ISBN
currentBook["ISBN"] = "123455"

# user for loop to iterate through the currentBook's values
# notice the order the for loop gives the values.
print ("the current book has these values:")
for value in currentBook.values():
    print ("  => {}".format(value))
```

9. Try creating a dictionary object using a constructor

```
student = dict(firstname = "joe", lastname="bloggs")
print student
```

References.

https://www.w3schools.com/Python/module_random.asp