School of Computing
National University of Singapore
Biometrics Course
July 2016

Assignment #1

Part I

Solve the questions below by a Python function or script.

1. Add up the even numbers from 1 to 100 and output their sum, using while and for loops.(5)

2. Read a string from console and output its length, convert it to lower case and upper case, and reverse it. (Hint: try string slice with step -1) (5)

3. Read a string from console. Split the string on space delimiter (" ") and join using a hyphen ("-"). (Example: input the string "this is a string" and output as "this-is-a-string") (5)

4. Learn the Python list operations and follow the commands below: (5)

- Initialize an empty list L.
- Add 5, 10, 3 to the list.
- Insert 9 to the head of the list;
- Double the list. (**e.g.** change $L = [1, 2, 3]$ to $L = [1, 2, 3, 1, 2, 3]$)
- Remove all 10 in the list.
- Reverse the list.

5. Define a function for insertion sort and use the code below to test you sort function. (10)

```
import random

def InsertSort(seq):
    #define your function here

testseq = []
for i in range(20):
    testseq.append(random.randint(1, 200))
print(testseq)
print(InsertSort(testseq))
```

Part II

This part is to acquaint you with basic Python matrix operation. It requires the Numpy library to be installed for Python.

1. To use functions from Numpy, you need to first import the library by

```
import numpy as np
```

This script you import Numpy library as the name of "np". Now you can do the following operations.

2. Generate a matrix from a list.

```
M = np.array([1,1,1])
```

3. Convert a matrix to a list.

```
L = list(M)
```

4. Generate a random array.

```
M = np.random.randint(1,100,(100,100))
```

5. Display the size of a matrix

```
print(M.shape)
```

6. Perform a transpose.

```
M_transpose = M.T
```

7. Travel this matrix and compute the sum of all elements. (Hint: use M.shape)

8. Compute the sum of its $50th$ column and $50th$ row.

9. Multiply each element by 2.

10. Compare difference of $M * M$ and $M.dot(M)$.

Submission

Please submit all your code for Part I only. The code for each question should be in a separate file, named Qn.py where n is the question number. Zip all files into a single file and name it as XXX_assignment1.zip, where XXX is your name in English. Send the zip file to lijing@comp.nus.edu.sg.

Deadline: 16 July 2.00pm.