University of South Australia

UniSA STEM

COMP 1039 Problem Solving and Programming

Practical 4

List data type and for loops

Create a file in order to complete **all** of the following exercises (refer to practical 1 or ask your supervisor if you are having problems doing so).

As seen below, your files should include appropriate comments consisting of the following – file name, your details, version number and date, brief program description and the University's academic misconduct statement. **All practical and assignment work you produce in this course should have the following comments.**

```
#
# File:       filename.py
# Author:     your name
# Email Id:   your email id
# Description:   Practical 4.
#   This is my own work as defined by the University's
#   Academic Misconduct policy.
#
```

Question 1

What is the output produced by the following code? Check your answers using Python.

a)

```
for k in range(4):
    print(k)
```

b)

```
for k in range(0,10,2):
    print('k is:', k)
```

c)

```
string = 'Sooo much fun!'
for k in string:
    print(k)
```

d)

```
string = 'Sooo much fun!'
for k in range(len(string)):
    print(string[k])
```

e)

```
string = 'Sooo much fun!'
```

```
for k in range(1,len(string),2):
    print(string[k])
```

f)

```
fruit = ['apple', 'pear', 'banana', 'orange', 'watermelon']

if 'pear' in fruit:
    print('Yes it is!')
else:
    print('No it isn''t!')
```

g)

```
str1 = 'Wednesday Thursday Friday'
new_string = ''

for char in str1:
    if char.isupper():
        new_string = new_string + char

new_string = new_string + '!?!'
print(new_string)
```

h)

```
str1 = 'Wednesday Thursday Friday'
new_string = ''

for char in str1:
    if char.isupper():
        new_string = char + new_string

new_string = new_string + '!?!'
print(new_string)
```

i)

```
num_list = [3, 4, 8, 9, 2, 4, 7, 3, 1]
new_string = ''

index = 0
while index < len(num_list):
    if index % 2 == 0:
        new_string = new_string + str(num_list[index])

    index = index + 1

print(new_string)
```

j)

```
num_list = [3, 4, 8, 9, 2, 4, 7, 3, 1]
result = 0

index = 0
while index < len(num_list):
    if index % 2 == 0:
        result = result + num_list[index]

    index = index + 1

print(result)
```

k)

```
result = 0

for index in range(10):
    result = result + index

print('Result is: ', result)
```

l)

```
result = ''

for index in range(10):
    result = result + str(index)

print('Result is: ', result)
```

m)

```
for loop in range(3):
    for loop1 in range(1):
        for loop2 in range (2):
            print('#', sep='', end='')
        print(' ', sep='', end='')
print('!')
```

Question 2

What is the output produced by the following code? Check your answers using Python.

a)

```
info = [2, 6, 3, 1, 5, 9, 12, 4]

print(info[1])
print(len(info))
print(info[-1])
print(info[info[4]])
print(info[1] * info[6])
index = 5
print(info[index])
```

b)

```
info = [2, 'four', 6, 'eight', 10]

print(info[0])
print(info[1])
info[1] = 'two'
print(info[-1])
print(info[-2])
print(info[1])
print(info.count('four'))
print(info.index(6))
```

c)

```
string1 = "These pretzels are making me thirsty!"

wordList = string1.split()

print(wordList)

for word in wordList:
    print(word)
```

d)

```
names = ['Tony Stark', 'Lex Luthor', 'Selina Kyle', 'Bruce Wayne', 'Peter Parker']

for k in names:
    print(k)
```

e)

```
names = ['Tony Stark', 'Lex Luthor', 'Selina Kyle', 'Bruce Wayne', 'Peter Parker']

print(names[1:4])
```

Question 3

a) Create a list called `list1` which is initialized with the following numbers:

```
7 21 11 2 5 1 15
```

b) Create a list called `list2` which is initialized with the following numbers:

```
0 0 0 0 0 0 0
```

c) Access the numbers stored in elements 1 and 3 of the `list1` list, add them together and store the result in element 2 of `list2`.

d) Sort `list1` and display the result to the screen – using the print function.

e) Display `list2` to the screen – using the print function.

Question 4

a) Create a list called `xy` which is initialized with the following values:

```
4, 3, 2, 1, 0, 'new', 'old'
```

b) Display `xy` to the screen – using the print function.

c) Iterate over the values in `xy`, displaying each value. You will need to use a for loop to do this.

d) Write a statement that will return the first three values of the list (Hint: you will need to use slicing).

e) Write a statement that will return the last three values of the list (Hint: you will need to use slicing).

f) Change the value of element 4 to the string “same”.

g) Display `xy` to the screen – using the print function.

h) Display the values in `xy` in reverse.

Question 5

Use a for loop to sum the elements in the following list:

```
numbers = [7, 8, 2, 0, 1, 6, 3, 4]
```

Check your answer using the Python built-in `sum` function.

Question 6

Solve question five (5) using a while loop (**instead** of a for loop).

Question 7

Use a for loop to count how many times the letter `'a'` appears in the string `'fanta'`.

Check your answer using Python’s string method called `count()`.

Question 8

Solve question seven (7) using a while loop (**instead** of a for loop).

Question 9

The area of a circle is calculated by the following formula : πr^2

The following list stores the radii of 5 circles.

```
radii = [5, 2, 4, 3, 1]
```

Given the above formula, calculate and display the area of each of the five circles.

Your output should be as follows:

```
Radius is: 5 Area is: 78.5398163397
Radius is: 2 Area is: 12.5663706144
Radius is: 4 Area is: 50.2654824574
Radius is: 3 Area is: 28.2743338823
Radius is: 1 Area is: 3.14159265359
```

Hint: you will need to use a for loop to do this.

Question 10

Solve question nine (9) using a while loop (**instead** of a for loop).

Question 11

Write a program that creates 10 random numbers between 1 and 20 and displays the highest of those numbers to the screen.

Question 12

This question builds on the program written in last week's tutorial work.

Modify the program as follows:

a. Generate a random number between 1-100 (instead of 1-10).

b. Add a while loop which allows the user to keep guessing until they guess the correct number.
Refer to the following algorithm for help with this (an algorithm is a set of steps describing how you would solve a problem – it is written in simple English and provided to help you solve this problem):

```
generate a random number
prompt for and read user’s guess

WHILE user’s guess is not equal to random number
    Display – ‘'Too bad - please try again!'
    prompt for and read user’s guess

Display - 'Well done - you guessed it!'
```

Please note: the provided algorithm is not Python code. It has been provided in order to assist you with solving this problem. Using the algorithm provided, helps you think less about the steps needed in order to solve the problem, and more about how you would write it in Python.

c. Make it a little easier for the user by letting them know whether a guess was too high or too low. i.e.

```
generate a random number
prompt for and read user’s guess

WHILE user’s guess is not equal to random number
    IF guess < number
        Display – ‘'Too low - please try again!'
    ELSE
        Display – ‘'Too high - please try again!'

    prompt for and read user’s guess

Display - 'Well done - you guessed it!'
```

d. Modify your code further to ask the user whether they wish to play again (hint: you will need to nest while loops to get this to work).

```
set variable play = ‘y’
WHILE play == ‘y’
    generate a random number
    prompt for and read user’s guess
    WHILE user’s guess is not equal to random number
        IF guess < number
            Display – ‘'Too low - please try again!'
        ELSE
            Display – ‘'Too high - please try again!'

        prompt for and read user’s guess

    prompt whether user would like to play again
```

Make sure your code is correctly indented and contains comments in order to correctly describe its use. Doing so will develop graduate quality 6 (use of communication skills) by producing source code that has been properly formatted, and by writing adequate, concise and clear comments.

Question 13

Describe what the following program does. Check your answer using Python.

```
index = 0
output_string = ''

user_input = input("Enter a string: ")

while index < len(user_input):
    char = user_input[index]
    if char != 'a' and char != 'e' and char != 'i' and char != 'o' and char != 'u':
        output_string += char
    index += 1

print(output_string)
```

Checkpoint: Please make sure your supervisor has seen the work you have completed so far.

Please make sure you save and keep all of your practical and assignment work. Please ask your supervisor if you are having difficulties doing so.

End of practical 4.