CURTIN COLLEGE

In association with Curtin University

Mid-Trimester Test – Trimester 1, 2021

SUBJECT: FUNDAMENTALS OF PROGRAMMING FOP1005

TIME ALLOWED:

Two (2) hours examination preceded by a 10-MINUTE READING PERIOD. You can complete the test within 24 hours as it is a take home test.

Guidelines:

Attempt all the questions.

Submit the Declaration of Originality along with the test. You can find it on Moodle.

Coding questions need to be submitted as different python files.

This is an open book test so you can use all the resources (Lecture slides, Practicals and google) to complete the test.

Zip all the files and upload on Moodle.

GENERAL INSTRUCTIONS:

This paper consists of Five (5) questions with a total of 100 marks.

ATTEMPT ALL QUESTIONS

Name: _____

Student No: _____

Tutor Name: _____

Q1	
Q2	
Q3	
Q4	
Q5	
Total	

QUESTION ONE (Total: 20 marks): Data Types, Python and Linux.

a) **(5 marks)** Write code to modify **Fibonacci.py** (below):

i) **Correct** the errors and run the code. (2)
ii) Write the correct **operator** in place of the '?' symbol. (1)
iii) Write the correct **data type** in place of <data_type> in the first line of the code. (1)
iv) **Explain** the purpose of count+=1 in a comment. Put the comment before the line. (1)

(Submit separately as a python file)

```
# Program to display the Fibonacci series up to nth term
num = <data_type> (input("How many terms? ")

# first two terms
n1, n2 = 0, 1
count = 0

# check if the number of terms is valid
if num ? 0:
   prin("Please enter a positive integer")
elif num == 1:
   print("Fibonacci sequence upto' ,num,":")
   print(n1)
else:
   print("Fibonacci sequence:")
   while count < num:
      print(n1)
      nth = n1 + n2

# update values
      n1 = n2
      n2 = nth
      count += 1
```

b) **(5 marks)**. Explain the difference between **Syntax** and **Semantic** errors with examples.

c) **(5 marks)**. What **type** of variable will result from each of the following:

i) variable1 = 5 <= 10 _____

ii) variable2 = len(instring)-1 _____

iii) variable3 = fileobj.close() _____

iv) variable4 = 12 % 5 _____

v) variable5= 10/3 _____

d) **(5 marks)**. Write **Linux commands** for the following:

i) **Copy** a file test1.py from Prac01 directory to Subdir1 directory in the following directory structure. (2)

FOP-
Prac01
Prac02
Prac03-
Subdir1
Subdir2

(Where FOP is at the top level then Prac01, 02 and 03 are at next level and Subdir1 and 2 are next to next level.)

ii) To **find** a hidden file in a directory.(1)

iii) To **delete** a directory DIR which has a file test2.py in it. (2)

QUESTION TWO (Total: 20 marks): Arrays and Plotting

a) **(5 marks).** What is the **output** of the following code? Which python **package** should be included for the following code to work?

ArrayExample.py

```
A = [[13, 14, 7, 4], [17, 8, 12], [12, 10, 14, 7], [14, 17, 10, 8]]

print (A[0])

print (A[1][2])
```

b) **(5 marks)**. Write a program in python to**:**

i. Create 2 arrays A1 and B1 with 3 elements each (A1= [15, 12, 16] and B1= [10, 13, 18]).

ii. Add and subtract elements of A1 and B1.

iii. Multiply and divide the elements of A1 and B1. (Submit separately as a python file)

c) **(5 marks)**. Modify the code and plot the output according to the given instructions.

(Submit separately as a python file)

```
#Add the required packages to make the program work.
Names1 = ['part_1', 'part_2', 'part_3']
Values1 = [1, 10, 100]

plt.figure(figsize=(9, 3))

plt.subplot(131)
#add code here for plotting a bar graph using Names1 and Values1
plt.subplot(132)
#add code here for plotting scatterplot using Names1 and Values1
plt.subplot(133)
plt.plot(Names1, Values1)
plt.suptitle('Different types of plotting')
#add the code here to save the figure with name “Display.png”
plt.show()
```

d) **(5 marks)**. The following code creates four arrays: t, t2, t3 and t4. Modify the code to:

- plot t and t3 as red dots (1)
- plot t2 and t4 as green dotted lines (1)
- add a supertitle "Four Powerful Plots" (1)
- plot the four plots as subplots in a 2x2 grid (2)

(Submit separately as a python file)

multilineplot.py

```
import numpy as np
import matplotlib.pyplot as plt

t = np.arange(0., 5., 0.2)
t2 = t**2  t3
= t**3  t4 =
t**4


#plt.plot(t, t, t, t2, t, t3, t, t4)
#plt.show()
```

QUESTION THREE (Total: 20 marks) Functions/List Comprehensions

a) **(8 marks)**. Write three functions for calculating the Sum, Min and Max of an Array containing 10 values (using the def keyword). Do not use the inbuilt functions. Write the code for calling these functions in a separate file or the same file for the program to run properly. (Hint: You should use control structures) (Submit separately as a python file)

b) **(6 marks)** Explain with an example the situation where using read() is appropriate and also an example where readlines() is appropriate.

c) **(6 marks)** Write **list comprehensions** to generate the following:

i) If **numlist** contains a list of numbers, create a new list that contains only those numbers that are **greater than 100.**
(e.g. [42, 130, 7, 100, 101] becomes [130, 101])

ii) If **wordlist** contains a list of strings, create a new list that has the **words that start with "g" or "G"**.
(e.g. ["Papaya", "guava", "Mango", "Grapes"] becomes ["guava","Grapes"])

QUESTION FOUR (Total: 20 marks) Multi-Dimensional Arrays, Plotting and Unix

a) **(5 marks)** Modify the code below to resize the array into (1, 27) and (3, 9). Then set the element [0,1,1]=1, [1,0,2]=2 and [2,1,2]=3. Run the code and display the results.
(Submit separately as a python file)

```
## zeros.py -creating and resizing an array#
import numpy as np
print('\nZERO ARRAY\n')
zeroarray = np.zeros((3,3,3))
print('Zero array size: ', np.size(zeroarray))
print('Zero arrayshape: ', np.shape(zeroarray), '\n')
print(zeroarray)
```

b) **(5 marks)** Modify to the following code to shift, rotate and crop the image. You can choose the coordinates of shifting yourself.
(Submit separately as a python file)

```
## prettyface.py
#import matplotlib.pyplot as plt
from scipy import ndimage
from scipy import miscface = misc.face(gray=True)
plt.imshow(face)
plt.imshow(face, cmap=plt.cm.gray)
plt.show()
```

c) **(10 marks)** Write Linux commands for the following:

i. To Change the name of the existing file. (2)
ii. To show the current working directory. (2)
iii. To go one level up in the directory structure. (2)
iv. To change directory. (2)
v. To accept parameters at the command line rather than hard coding them within the program. (2)

QUESTION FIVE (Total: 20 marks) Files and Grids

a) **(5 marks)**. Explain Moore and von Neumann neighbourhood with an example.

b) **(5 marks).** Refer to the heat.py in Lecture 5 (lecture slides). Explain how first graph changes to the second and then third graph.

c) **(5 marks)** Write a program to enter 5 values from a file (.txt or .csv), double those values and then output them to a file (.txt or.csv). (Hint: 1,2,3,4,5 becomes 2,4,3,8,10)

(Submit as a separate python file)

d) **(3 marks)** Explain the meaning of file1.close () in detail.

e) **(2 marks)** What is the purpose of documentation along with coding? How have we done it with our Practicals and PracTests?

END OF TEST