Assumption University

Vincent Mary School of Science and Technology

Final Examination Session 1

Semester 1/2021

Subject: CSX3001/ITX3001 Fundamentals of Computer Programming

Date: 20th September 2021

Time: 13:30 – 16:30 (3 hours)

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Instructions:

1. Read the questions carefully and answer each question completely, legibly, and concisely.
2. Answer all questions in accordance with the instructions specified.
3. This is an open book and online examination.
4. If you have answered all questions, upload all Python files to a designated portal (Microsoft Teams, Assignment).
5. Upload your answers to designated portal (MS Team and Email).

Marking Scale: Full Score 20 marks from **2 Required** Questions and **5 Optional** Questions

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This is to inform that please follow the instructions carefully.
Failing to do so may result in no marking for your answer papers.

1. (6 points, required) Recurrence Relations

$$\boldsymbol{f(n) = 3 \times f(n-1) + f(n-2) + 4}$$

$$where\ f(1) = 1, f(2) = 3, and\ n > 0$$

Write a Python program to compute the given function $f(n)$ which asks the user to enter a positive integer n and prints out the output of the function from $f(1)$ to $f(n)$.

Sample Input/Output #1

Enter a positive integer: 3
n = 1, f(1) = 1
n = 2, f(2) = 3
n = 3, f(3) = 14

Sample Input/Output #2

Enter a positive integer: 0
Please enter a positive integer!

Sample Input/Output #3

Enter a positive integer: 10
n = 1, f(1) = 1
n = 2, f(2) = 3
n = 3, f(3) = 14
n = 4, f(4) = 49
n = 5, f(5) = 165
n = 6, f(6) = 548
n = 7, f(7) = 1813
n = 8, f(8) = 5991
n = 9, f(9) = 19790
n = 10, f(10) = 65365

Note that: Either loop or recursive function is acceptable.

2. (6 points, required) Any Base from Decimal

The following function, namely $decToNBase(decimal, N)$, aims at converting a positive integer parameter (decimal number) into a string result which is the representation of the specified base number ($N, 2 \leq N \leq 16$). Complete the following code so that the function generates the correct output as shown below.

```
def decToNBase(decimal, N):

    #################################
    #     Insert your code here!    #
    #################################

print("**Question 2**")
number = 131
for i in range(2, 17):
    value = decToNBase(number, i)
    print(f"The base {i} of the base 10, {number} is {value}")
print()
print("*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-")

number = -56
print(decToNBase(number, 5))
```

Sample Output

```
**Question 2**
The base 2 of the base 10, 131 is 10000011.
The base 3 of the base 10, 131 is 11212.
The base 4 of the base 10, 131 is 2003.
The base 5 of the base 10, 131 is 1011.
The base 6 of the base 10, 131 is 335.
The base 7 of the base 10, 131 is 245.
The base 8 of the base 10, 131 is 203.
The base 9 of the base 10, 131 is 155.
The base 10 of the base 10, 131 is 131.
The base 11 of the base 10, 131 is 10A.
The base 12 of the base 10, 131 is AB.
The base 13 of the base 10, 131 is A1.
The base 14 of the base 10, 131 is 95.
The base 15 of the base 10, 131 is 8B.
The base 16 of the base 10, 131 is 83.

*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
No Output!, invalid parameter(s)
```

3. (2 points, optional) Cumulative List

The following Python code aims to calculate the cumulative value from $list1$ to $list2$. The cumulative are assigned sequentially to each index. However, the code does contain error(s) and does not produce the expected output. Fix the code so that the function generates the correct output.

```
list1 = [1, 2, 3, 4, 5]
list2 = [0, 0, 0, 0, 0]

for i in range(1, len(list2)):
    x = 0
    for j in range(1, list[i]):
        x = list1[j]
    list2[i] = x
    print("list2[{i}] = list2[i]")
```

Sample Output for `list1 = [1, 2, 3, 4, 5]`

```
list2[0] = 1
list2[1] = 3
list2[2] = 6
list2[3] = 10
list2[4] = 15
```

Sample Output for `list1 = [6, 1, 8, 2, 4, 0]`

```
list2[0] = 6
list2[1] = 7
list2[2] = 15
list2[3] = 17
list2[4] = 21
list2[5] = 21
```


4. (3 points, optional) Character Separation

The following function, namely $separateChar(myStr)$, aims at separating an input string into three separate strings: uppercase characters, lowercase character and digits only. However, the function is not the complete function. Complete the code so that the function generates the correct output as shown below.

```
def separateChar(myStr):
    str1 = ''
    upper_char = ''
    lower_char = ''
    digit_char = ''

    ################################
    #     Insert your code here!   #
    ################################

    print(upper_char)
    print(lower_char)
    print(digit_char)

print("**Question 4**")
str1 = "Avenger 4 END GAME was released in Year 2019"
separateChar(str1)
print("= = = = = = = =")
str2 = "I am 109 years old"
separateChar(str2)
print("*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-")
```

Sample Output

```
**Question 4**
AENDGAMEY
vengerwasreleasedinear
42019
= = = = = = = =
I
Amyearsold
109
*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
```

5. (3 points, optional) Half Hundred

Given $listA$ down here, write a python code to put any numbers which are less than or equal to 50 to $list1$ and put any numbers which are greater than 50 to $list2$. Both of $listA$ and $listB$ must be sorted lists.

```
listA = [1, 3, 60, 73, 7, 88, 50, 13, 20, 98, 100, 2, 35, 40, 9]

################################
#     Insert your code here!   #
################################

print(f"list1 → {list1}")
print(f"list2 → {list2}")
```

Sample Output

```
list1 → [1, 2, 3, 7, 9, 13, 20, 35, 40, 50]
List2 → [60, 73, 88, 98, 100]
```

6. (2 points, optional) Sum Digits

The following Python function contains error(s). Fix the code in the function so that this function calculates a sum of all digits that appear in the input sentence. The expected output for this sentence is 16.

```
str1 = "Avenger 4 END GAME was released in Year 2019"
def sumOfDigitsFromString(strInput):
    sum_digit = 0
    for i in strInput:
        if i.isDigit():
            sum_digit += i
    print(sum_digit)

sumOfDigitsFromString(str1)
```

Sample Output

```
16
```

7. (6 points, optional) Product X

Write a Python function $ProductX(num\_list)$ that **returns** product of numbers in array num_list with these conditions:

- The product of numbers must be calculated from number 0 to 9.
- The number in the section starts with 0 and ends with another 0 will be calculated only from odd numbers.

Sample Return for $num\_list = [2, 3, 15, 0, 2, 3, 0, 7, 4, 0]$

```
126
```

Sample Return for $num\_list = [0, 23, 5, 8, 4]$

```
160
```

Sample Return for $num\_list = [2, 0, 15, 4, 2, 0, 0, 5]$

```
10
```

End of the examination.