Name:

Register no:

Class:



# NGEE ANN SECONDARY SCHOOL

## PRELIMINARY EXAMINATION

## COMPUTING

Paper 2 (Lab-based)

Additional materials:

#### 7155/02

### 1 August 2021

## 2 hr 30 min

Electronic version of LIBRARY.xlsx file Electronic version of SANDWICH.py file Electronic version of FACTORIAL.py file Insert Quick Reference Glossary

#### Instructions to Candidates

Write your name, register number and class at the top of this page.

Answer all questions.

All tasks must be done in the computer laboratory. You are not allowed to bring in or take out any pieces of work or materials on paper or electronic media or in any other form.

Programs are to be written in Python. Save your work using the file name given in the question as and when necessary.

The number of marks is given in brackets [] at the end of each question or part question. The total number of marks for this paper is 50.

For Examiner's Use

Checked by student: \_\_\_\_\_ Date:

This document consists of <u>9</u> printed pages and <u>1</u> blank page.

#### Task 1

A private library uses spreadsheet to keep a record of its books, including generation of book IDs, location of books and their loan status.

Open the file LIBRARY.xlsx. You will see the following data.

	Α	В	С	D	E	F	G	
1		Today's Date:						
2		LIBRARY RECORDS						
	Conro	Shelf	Book	Book	Loan	Extend	Loan Ex	
3	Genre	ID	ID	Title	date	Exteriu	Date	
4	GEO	00	GEO0063129	Planet Earth	9 September 2021			
5	GEO	02	GEO0188940	Gems	20 September 2021	Yes		
6	FIN	00	FIN0020604	Investing 101	29 August 2021	Yes		
7	GEO	02	GEO0042447	Volcano Land	-			
8	BIB	01	BIB0234074	Steven Wonders	7 September 2021			
9	OTH	02	OTH0016592	Magazines	11 September 2021			
10	FIN	01	FIN0288489	Wall street legends	-			
11	BIB	00	BIB0157369	Eddio Gaxiario	-			
12	FIN	02	FIN0254526	rich bro poor bro	11 September 2021			
13	GEO	00	GEO0171880	twelveth ocean	-			
14	FIN	00	FIN0050172	money mind	6 September 2021	Yes		
15	ART	02	ART0294228	music and society	12 September 2021			
16	GEO	00	GEO0082743	terraforming	18 September 2021			
17	OTH	00	OTH0059956	Education	-			
18	SCI	00	SCI0250607	Kitchen Science	-			
19	GEO	01	GEO0040616	Martian Land	-			
20	OTH	02	OTH0072890	Blank	3 September 2021	Yes		
21	SCI	02	SCI0024387	Newtonian Mechines	-			
22	SCI	01	SCI0138847	Darwinian Dream	-			
23	ART	02	ART0290104	Theatrics	3 September 2021			
24	ART	02	ART0222352	Manga Artists	15 September 2021			
25	SCI	01		Discovery	-			
26								
27								
28								
29								

Save the file LIBRARY\_<class>\_<inde as number> <your name>.xlsx

- 1 In cell G1, enter an appropriate formula that will automatically generate the current date. [1]
- 2 The **Book ID** is generated by using the function CONCATENATION. The Genre, Shelf ID and a random 5 digit number are joined together using CONCATENATION.

In cell C25, use the CONCATENATION function together with an appropriate function to generate a **Book ID**. [1]

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3 Each book loan has a duration of 14 days. An extension on the book loan adds another 7 days. Books that are not loaned out will have a dash '-' in their Loan Expiry Date.

In cells **G4** to **G25**, enter a formula that uses appropriate functions to show the Loan Expiry Date. If the book is not on loan, the Loan Expiry Date should show only a dash '-'. [2]

4	In cells <b>H4</b> to <b>H25</b> , enter a formula that uses appropriate functions to show the status of the book.					
	"On-Loan" for books loaned out but not due. "Overdue" for books loaned out and passed the loan expiry date.					
	"available" for books not loaned out.	[2]				
5	In cells <b>H4</b> to <b>H25</b> , use a formatting tool to change the colour of the status. Yellow for books On-Loan Red for books Overdue					
	Green for books available	[1]				
6	The first 5 characters of the <b>Book ID</b> indicates which shelf the books are kept.					
	In cells <b>I4</b> to <b>I25</b> , enter a formula that uses appropriate functions to show the shelves where the books should be.	[2]				
7	The <b>Inventory</b> table shows the total number of books that the library has for each <b>Genre</b> .					
	In cells <b>L23</b> to <b>L28</b> , enter a formula that uses appropriate functions to count the number of books for each genre.	[1]				
	Save and close your file.					

#### Task 2

The following program is written for a sandwich bar for customers to place orders and calculate the cost of the sandwiches they have ordered.

```
toppings = ['ham', 'cheese', 'lettuce', 'tomatoes']
top_cost = [1, 0.8, 0.5, 0.5]
print("Welcome to All-Health Salad Bar!")
print("Please select your toppings below.")
ham = int(input("Quantity of ham: "))
cheese = int(input("Quantity of cheese: "))
lettuce = int(input("Quantity of lettuce: "))
tomatoes = int(input("Quantity of lettuce: "))
total_cost = ham*top_cost[0] + cheese*top_cost[1] + lettuce*top_cost[2]
+ tomatoes*top_cost[3]
print("Total cost: $", total cost)
```

```
-
```

Open the file **SANDWICH.py** 

Save the file as **MYSANDWICH**\_<your name>\_<centre number>\_<index number>.py

8 Capsicum, a new topping, is added to the list of toppings and will be priced at \$0.80 per unit.

Edit the program so that the new topping is available for selection. [3]

Save your program.

9 Save your program as MYSANDWICH2\_<your name>\_<centre number>\_<index number>.py

Each order should be at least \$3.

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Edit the program so that the user will be continually prompted to re-order if the [2] selection is less than \$3.

Save your program.

1 Save your program as **MYSANDWICH3**\_<your name>\_<centre number>\_<index

#### 0 number>.py

Customers will get a free drink if the sandwich ordered costs more than \$5.

Edit the program to inform eligible customers on the free drink. Your program should inform the user with the following message:

"You are entitled to a free drink."

Save your program.

Save your program as **MYSANDWICH4** <your name> <centre number> <index 1 1

number>.py

Each topping is given a health score as shown below:

Ham: -1 Cheese: -0.5 Lettuce: 3 Tomatoes: 2.5 Capsicum: 3.2

Edit the program to calculate the health score of the purchased sandwich. Orders with a health score of more than 10 will be entitled to \$1 discount. [3]

Save your program.

[2]

#### Task 3

The program below prompts the user to enter the lower and upper limits of a range of numbers, generates the factorials of all the numbers within the limits (inclusive) and highlights the numbers that are harshad and/or palindromic numbers.

The factorial of a number, n, can be written as n! such that

$$n! = n \times (n-1) \times (n-2)... \times 1.$$

For instance,  $3! = 3 \times 2 \times 1 = 6$  and  $9! = 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 362880$ .

It is known that the factorials of all numbers that are smaller than 432 are harshad numbers and that some of these factorials may be palindromic numbers as well.

A harshad number is an integer that is divisible by the sum of its digits. The number 18 is a harshad number because the sum of the digits 1 and 8 is 9 (1 + 8 = 9), and 18 is divisible by 9.

Other examples of Harshad numbers are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 18, 20, 21, ...

Palindromic numbers refer to numbers that look the same even when the digits in the numbers are reversed.

Examples of palindromic numbers include 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 22, 33, ..., 1001, ...

A sample output of the program is as shown below:

```
Enter the lower limit: 1
Enter the upper limit: 432
1! = 1 is a harshad number.
Factorial of 1 is palindromic as well!
2! = 2 is a harshad number.
Factorial of 2 is palindromic as well!
3! = 6 is a harshad number.
Factorial of 3 is palindromic as well!
4! = 24 is a harshad number.
5! = 120 is a harshad number.
```

```
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```

Factorial of 432 is NOT a harshad number.

#### There are several syntax and logic errors in the program.

```
lower = input("Enter the lower limit: ")
upper = input("Enter the upper limit: ")
for num in range(lower, upper):
    factorial = 0
    factor = num
    for k in range(factorial):
        factorial *= factor
        factor += 1
    j = factorial
    total = 0
    i = j
    while i > 10:
        total += i/10
        i = i / / 10
    total += i
    if j % total = 0:
        print(str(num)+"! =", j, "is a harshad number.")
        if str(j) == str(j)[::1]:
            print("Factorial of", num, "is palindromic as well!")
    else
        print("Factorial of", num, "is NOT a harshad number.")
```

#### Open the file FACTORIAL.py

Save the file as **MYFACTORIAL\_**<your name>\_<centre number> <index number>.py

```
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```

Identify and correct the errors in the program so that it works according to the rules 1 [10

1

2 given.

Save your program.

#### Task 4

In a printed circuit board manufacturing line, sampling is done to monitor the number of defects in the manufactured products.

During sampling, the quality check inspector will check a batch of 10 boards. Boards that pass the check must be indicated with a "1" while those that are defective must be indicated with a "0".

A sample line of the batch report is as shown below:

1,0,1,1,1,1,1,1,0,1

This indicates that there are 2 defects among the 10 boards in this batch.

Develop a program that prompts the inspector to enter the batch info for 5 batches of boards as shown below.

1,0,1,1,1,1,1,1,0,1 1,1,1,1,1,1,1,0,0,1 1,1,1,1,1,0,1,1,1,1 1,1,1,1,1,1,1,1,1,1,1 1,0,1,1,1,1,1,1,0,1

The program should eventually print the percentage of defects in the 5 batches, rounded to the nearest 1 decimal place.

Your output must look like this:

Info for batch 1: 1,0,1,1,1,1,1,1,0,1 Info for batch 2: 1,1,1,1,1,1,1,0,0,1 Info for batch 3: 1,1,1,1,1,0,1,1,1,1 Info for batch 4: 1,1,1,1,1,1,1,1,1,1 Info for batch 5: 1,0,1,1,1,1,1,1,0,1 The percentage of defects is 14.0 %

**1** Write your program and test that it works.

Save your program as **MYSAMPLING**\_<your name>\_<centre number>\_<index number>.py

- 1 Save your program as **MYSAMPLING2**\_<your name>\_<centre number>\_<index
- 4 number>.py

The program should validate all the data entered by the inspector. Extend your program to include the necessary validation checks and prompt the inspector to reenter until the correct inputs have been entered. [6]

Save your program.

- 1 When your program is working, use the following test data to show your test results:
- 5

3

```
Test Output:
```

Take a screen shot of your results and save it as **MYSAMPLE**\_<your name>\_<centre number>\_<index number>

Save your files in either .png or .jpg format.

- 1 Save your program as **MYSAMPLING3**\_<your name>\_<centre number>\_<index
- 6 number>.py

Extend the program so that more than 1 inspector can key in the batch information. The program should prompt the first user to enter the number of inspectors who will be entering the information, and end after the data input by the last inspector. [3]

#### Sample output:

[9]

[2]

Info for batch 4: 1,1,1,1,1,0,1,1,1,0
Info for batch 5: 1,1,1,1,1,1,0,1,1,1
The percentage of defects is 12.0 %

Save your program.

-- End of Paper --

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