For revision practice

SCHOOL OF SCIENCE AND TECHNOLOGY, SINGAPORE

SECONDARY 4
PRELIMINARY EXAMINATION

COMPUTING
Paper 2 7155/02
Practical (Lab-based)

23 August 2022 (Tuesday) **2 hours 30 minutes**

CANDIDATE NAME			
CLASS		INDEX NUMBER	

Additional Materials: Electronic version of `BLOSSOM.xlsx` data file
Electronic version of `BUBBLES.py` file
Electronic version of `BUTTERCUP.py` file
Insert Quick Reference Glossary

READ THESE INSTRUCTIONS FIRST
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	
Task 1	
Task 2	
Task 3	
Task 4	
Total	50

Task 1

Blossom Fresh Fruits and Vegetables uses spreadsheet software to create a receipt for a customer. The items ordered and their unit prices are listed.

You are required to help the shop finish up the spreadsheet.

Open the file **BLOSSOM.xlsx** and you will see the following data.

	A	B	C	D	E	F
1	**Blossom Fresh Fruits and Vegetables: Receipt**					
2	**Item**	**Unit Price**	**Units Ordered**	**Item Subtotal**	**Points per Item**	**Multiplier Applied**
3	Apples	$0.60	5			
4	Bananas	$1.20	2			
5	Chye Sim	$0.80	7			
6	Durians	$10.00	3			
7	Eggplants	$1.60	4			
8	French Beans	$3.60	10			
9	Garlic	$1.30	50			
10	Honeydew	$15.00	5			
11	Iceberg Lettuce	$2.00	8			
12	Jackfruit	$4.90	20			
13			**Total**			
14						
15	**Median Unit Price**					
16	**Total Price of Items with 10 or More Units Ordered**					
17						
18	**Bonus Point Multiplier**					
19	**Item**	**Lemons**	**Garlic**	**Jackfruit**	**Kale**	**Durians**
20	**Multiplier**	2	3	3	4	5

Save your file as **MYBLOSSOM_2022**_<your class>_<index number>_<your name>**.xlsx**

1 In cell **C15** enter a formula that uses (an) appropriate function(s) to find median unit price of all the types of fruits and vegetables sold. [1]

2 In cell **C16** enter a formula that uses (an) appropriate function(s) to find total price of the items with 10 or more units ordered. [1]

3 In cells **D3** to **D12** enter a formula to calculate the **Item Subtotal** for each item. The Item Subtotal is the unit price multiplied by the number of units ordered. [1]

4 In cell **D13**, enter a formula that uses (an) appropriate function(s) to calculate the **Total** that the customer should pay. [1]

5 Blossom Fresh Fruits and Vegetables has a loyalty point system. For each item bought, every $1 spent will earn the customer 1 point. The number of points earned per item is rounded down to the nearest whole number.

In cells **E3** to **E12** enter a formula that uses (an) appropriate function(s) to calculate the number of **Points per Item** earned. [1]

6 For certain items, the shop also offers a bonus multiplier on the number of points per item earned. This multiplier can vary between 2 times to 5 times the calculated number in the **Points per Item** column. The items with the bonus points multiplier and their respective multipliers are shown in the **Bonus Points Multiplier** table.

In cells **F3** to **F12** enter a formula that uses (an) appropriate function(s) to search for the **Bonus Multiplier** in the **Bonus Points Multiplier** table. If the item is not in the table, the cell in the corresponding row should show "1". Otherwise, the cell should show the bonus multiplier for the item. [3]

7 In cells **A3** to **F12**, use a conditional formatting tool to make the text red in the rows where the item name ends with 's'. [2]

Save and close your file.

Task 2 begins on the next page.

[Turn over

Task 2

The following program implements the bubble sort algorithm on a list of five integers that are inputted by the user. It will output the list from the smallest to the largest integer.

```
list_length = 5
def bubblesort(arr):
    for r in range(1,list_length):
        for p in range(0, list_length-r):
            if arr[p] > arr[p+1]:
                arr[p], arr[p+1] = arr[p+1], arr[p]
    return arr

arr = []
for i in range(5):
    num = int(input("Please input an integer: "))
    arr = arr + [num]

print("The sorted list:", bubblesort(arr))
```

Open the file **BUBBLES.py**

Save the file as **MYBUBBLES_2022**_<your class>_<index number>_<your name>**.py**

8 Edit the program so that it will work for any list length. The program must display a suitable input message. [1]

Save your program.

9 Edit the program so that it reverses the order of the sort. The program will then output the list from the largest to the smallest integer. [1]

Save your program.

10 Edit the program so that it checks that a valid integer has been inputted before adding it to the list. [5]
Save your program.

11 Edit the user-defined function `bubblesort(arr)` so that it removes duplicate values in the list. [3]

Save your program.

Task 3

Buttercup Florist offers a bouquet customisation service to their customers, where customers can choose up to three types of flowers to create their own bouquet. The types of flowers chosen do not have to be unique. Customers must pay an additional $5, in addition to the cost for each type of flower they choose to include in their bouquet as shown in the table below. The shop also offers a 10% discount on bouquets with three types of flowers, rounded off to the nearest cent.

The table below shows the types of flowers available and their cost.

Flower	Red roses	Pink roses	Buttercups	Baby's breath	Limonium
Cost ($)	7	9	10	3	5

The code asks users to enter the name of each flower they want in their bouquet. The code converts the flower name to lower case and adds its corresponding cost to the total. After the user has chosen the flowers they want, the code calculates the cost of the bouquet.

There are several syntax errors and logic errors in the code.

```
print('Welcome to Buttercup Customised Bouquets!')
print('Enter up to three flowers to create your bouquet.')

flowers = ['red roses', 'pink roses', 'buttercups', 'baby's breath',
'limonium']
prices = [7, 9, 10, 3, 5]

counter = 0
cost = 0
if counter < 3:
    flower = input('Please choose a flower: ')
    flower = flower.islower()
    if flower not in flowers:
        print('Sorry, we do not have that flower. Please try again!')
    continue
    flower_index = flowers.index(flower)
    cost += prices[flower_index+1]
    counter += 1
    if counter < 2:
        cont = input('Please enter "N" to end, or any other key to
continue: ').upper()
        if cont = 'n': break

if counter == 3:
    cost = int(0.9 * cost, 2)

print('The cost of your bouquet is ${}.'.format(cost))
```


[Turn over

Open the file **BUTTERCUP.py**

Save the file as **MYBUTTERCUP_2022**_<your class>_<index number>_<your name>**.py**

12 Identify **and** correct the errors in the program so that it works according to the requirements given. [10]

Save your program.

Task 4 begins on the next page.

Task 4

Most mover companies use the following expression to calculate the price quotes for their customers:

For every X kilogram or less, it will be charged at S dollars.

For example: If X = 20kg and S = \$10, then it will cost \$20 to move 30kg of items.

13 Write a user defined function using the following method signature:

```
get_quotes(weight, price, est_weight)
```

where `weight` and `price` are X and S in the above expression, and `est_weight` is the estimated weight of the items that the customer wants to move.

The function will return the price quote of the mover company for the given parameters.

Save your program as **MOVER_2022**_<your class>_<index number>_<your name>**.py** [3]

14 Jojo is moving house. You have been asked to write a program to help Jojo compare the cost incurred for N different mover companies, to help him make a decision about which one to hire.

He represents each company with an uppercase letter starting from A. For example, if N = 4, then the companies are A, B, C and D. All the mover companies use the same expression to calculate their price quote, but with different X and S values.

The program must:

- ask the user to input N, the number of mover companies
- ask the user to input of all the X values within a single line
- check if the inputted number of X values is valid, and prompt and allow the user to re-enter all the X values if at least one of the values is invalid
- ask the user to input of all the S values within a single line
- check if the number of S values is valid, and prompt and allow the user to re-enter all the S values if at least one of the values is invalid
- ask the user to input `user_weight`, the estimated weight of items to the user wants to move
- use `get_quotes()` to calculate the price quotes (rounded to two decimal places) for every company based on their X and S values, and `user_weight`
- display the price quotes, along with the uppercase letter representing the company

Write a program to meet the requirements. Your program must include appropriate input and output messages. You may assume that all the X and S values inputted are non-negative numbers. Data type validation is not required in this question.

Save your program. [8]

[Turn over

15 When your program is working, use the following test data to show your test result.

5
20 35 40 50
20 35 12 40 50
10 17 5.5 18 23 25.5
10 17 5.5 18 25.5
144

Take a screenshot of your result and save it as:
MOVERTEST_2022_<your class>_<index number>_<your name>
Save your file in either **.jpg** or **.png** format. [2]

16 Save your program as
MOVER2_2022_<your class>_<index number>_<your name>**.py**

Extend your program to:

- find and display the company(s) with the lowest price quote
- find and display the company(s) with the lowest price quote per kilogram of `user_weight`

Save your program. [4]

17 Save your program as
MOVER3_2022_<your class>_<index number>_<your name>**.py**

To ensure the stability of the crates being moved, Townsville Movers require each crate to have a certain minimum weight. This minimum weight varies from case to case. There is no maximum weight for the crates.

Given a total weight, *TW*, and the minimum weight, *MW*. Find the total number of combinations of weights that the crates can be packed in.

Sample input:
TW = 18
MW = 6
Returns: 6

Explanation
These are the following possible combinations: (18), (6, 12), (7, 11), (8, 10), (9, 9), (6, 6, 6).
In total, there are different 6 combinations.

Save your program. [3]

--- END OF PAPER ---