

4COSC006C Programming Principles I

Open book test – 23rd April 2020 10.30 am – 12.30 pm

Instructions:

Duration of the test 108 minutes and another 12 minutes is given for you to submit your answers. (**Before** 12.30 pm on the same day – within 2 hours, you must submit your answers).

Please note the following instructions related to test (****IMPORTANT****):

1. You must have IDLE installed with Python 3.X
2. You must have a compression tool to put all your python scripts in one directory/folder and compress it as one compressed file (.zip / .7z) Windows has an inbuilt compression tool that you can use.
3. There are 5 (20 marks each) questions having 2 parts for each and you must produce **10** python scripts named exactly in the following format:
Q1A.py Q1B.py
Q2A.py Q2B.py
Q3A.py Q3B.py
Q4A.py Q4B.py
Q5A.py Q5B.py
4. You must put all those .py files into one directory/folder and name that directory using your UoW ID. (ex: **w1674534.zip**)
5. Before you submit, Please make sure the compressed file is not corrupt by trying to extract it and opening the .py files in it.
6. Submit your compressed file via the submission link given before 12.30 pm 23rd April 2020.

Question 01 – A (12 marks)

Write a python program to take three numbers as user input and print the square and cube values of it in a table like given in the sample input output format.

Hint: You may need to do type conversion using appropriate function

Sample input and out put

Enter the first number: 3

Enter the second number: 5

Enter the third number: 10

Number	Square	Cube
3	9	27
5	25	125
10	100	1000

Question 01 – B (8 marks)

In a fish store, the weight of 10 fishes were recorded and the average weight was computed. Due to human error weights of three fishes were missed to be recorded. But fortunately, the salesman remembered that the three fishes' weight which he missed to record were equal. Write a program to input the average weight and the sum of known weights to find out the weight of a fish he missed to record. The known weight should only be rounded up to two decimal points as shown in the sample output.

Sample input and output

Enter the average weight: 100

Enter the sum of known weights: 800

Weight of the fish that was not recorded: 66.67

Question 02 – A (12 marks)

Write a python program to do implement a unit convertor. If the user enters 1, you need to get the input in yards and give the results in miles. If the user enters 2, you need to get the input in miles and give the results in yards. If user enters anything other than 1 or 2, you should enter a message saying “Invalid Input”

Miles = Yards/1760

Note that you must handle exception when the user enters anything other than number as the input.

Sample input and output:

Case 1:

Please select 1 to convert yards to miles and 2 to convert miles to yards.

Enter the conversion choice: 2

Enter the distance in miles: 5

Equivalent distance in yards: 8800

Case 2:

Please select 1 to convert yards to miles and 2 to convert miles to yards.

Enter the conversion choice: 1

Enter the distance in yards: 800

Equivalent distance in miles: 0.45454545454545453

Case 3:

Please select 1 to convert yards to miles and 2 to convert miles to yards.

Enter the conversion choice: 5

Invalid input

Case 4:

Please select 1 to convert yards to miles and 2 to convert miles to yards.

Enter the conversion choice: 1

Enter the distance in yards: abc

Please restart the program and enter numbers only as input.

Question 02 – B (8 marks)

A boutique hotel has three types of rooms and the charges for the rooms per day are as following.

Room Type	Room Code	Charge
Double Room	DR	12000/=
Twin Room	TR	17000/=
Master Suite	MS	24000/=

Further they provide discounts based on the number of day and the time they book the room for. Following table 1 provides the discount details.

	< = 2 Days	3 – 5 Days	>5Days
Jan, Feb, March	5%	10%	15%
April, May, June	8%	13%	18%
July, August, September	10%	15%	20%
October, November, December	3%	8%	11%

Write a python program to input the room type, number of days, month they wish to make the reservation and number of rooms to calculate and display the actual cost, discount received and their cost to pay. Note that a single user cannot reserve more than 5 rooms.

You must handle exception when a user enters anything other than number for number of rooms and number of days.

Sample input and output:

Case 1:

Enter the type of room: Double Room

Enter the month you wish to make the reservation: Jan

Enter the number of days: 2

Enter the number of rooms: 2

Total amount: 24000

Discount received: 1200

Total Payable : 22800

Case 2:

Enter the type of room: Family room

Enter the month you wish to make the reservation: Jan

Enter the number of days: 2

Enter the number of rooms: 2

Invalid selection for room

Case 3:

Enter the type of room: Family room

Enter the month you wish to make the reservation: Jan

Enter the number of days: abc

Please enter integers for number of days and number of rooms

Case 4:

Enter the type of room: Family room

Enter the month you wish to make the reservation: Jan

Enter the number of days: 2

Enter the number of rooms: abc

Please enter integers for number of days and number of rooms

Question 03 – A (12 marks)

Write a program which prints the following message:

“Do you really want to run this program? (y/n)”

The program loops, printing just this message until the user enters 'n' or 'N'. The message “You decided to leave. See you again!” needs to be printed and end the program execution if the user enters ‘n’ or ‘N’. The user can enter ‘q’ or ‘Q’ to terminate the program. If the user enters a character other than ‘n’, ‘N’, ‘y’ or ‘Y’ the message “Invalid selection is entered” should be displayed and the prompt is redisplayed.

Question 03 – B (8 marks)

Suppose you want to develop a program for a first-grader to practice subtraction. The program generates ten random subtraction questions for two integers between 1 and 50 (both inclusive), number1 and number2, with

number1 \geq number2, and it displays to the student a question such as “What is 9 - 2?” After the student enters the answer for each question, the program immediately displays a message indicating whether it is correct. Once the student answered all the questions, the correct count, test time and a summary need to be displayed.

Here is a sample run:

What is 28 - 2 ?

6

Your answer is wrong.

28 - 2 should be 26

What is 44 - 6 ? 38

You are correct!

What is 25 - 11 ?

14

You are correct!

What is 35 - 20 ?

1

Your answer is wrong.

35 - 20 should be 15

What is 29 - 25 ?

4

You are correct!

What is 22 - 22 ?

0

You are correct!

What is 18 - 10 ?

8

You are correct!

What is 47 - 16 ?

23

Your answer is wrong.

47 - 16 should be 31

What is 37 - 36 ?

1

You are correct!

What is 39 - 39 ?

0

You are correct!

Correct count is 7

Test time is 68 seconds

28-2=6 wrong

$44-6=38$ correct

$25-11=14$ correct

$35-20=1$ wrong

$29-25=4$ correct

$22-22=0$ correct

$18-10=8$ correct

$47-16=23$ wrong

$37-36=1$ correct $39-39=0$

correct

Question 4 – A (12 marks)

Write a program using for loops structure to display a multiplication table as shown below.

Multiplication Table

	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Question 4 – B (8 marks)

In business applications, you are often asked to compute the mean and standard deviation of data. The mean is simply the average of the numbers. The standard deviation is a statistic that tells you how tightly all the various data are clustered around the mean in a set of data.

For example, what is the average age of the students in a class? How close are the ages? If all the students are the same age, the deviation is 0.

Write a program using for loops structure that prompts the user to enter 10 numbers, and displays the mean and standard deviations (limit floats to two decimal points) of these numbers using the following formula:

Sum of the First n Positive Integers

$$sum = 1 + 2 + 3 + 4 + \dots + n = \sum_{i=1}^n X_i$$

Mean

$$mean = (\sum_{i=1}^n X_i) / n$$

Deviation

$$\text{deviation} = \sqrt{\frac{\sum_{i=1}^n X_i^2 - (\sum_{i=1}^n X_i)^2 / n}{n - 1}}$$

Hint:

Python has a math module that provides pre-written mathematical functions.

`math.sqrt(x)`

Return the square root of x For

example:

`math.sqrt(81) # Returns 9.0`

Built-in function `pow()` return base to the power exp.

For example:

`pow(3,4) # Returns 81`

Here is a sample run:

```
Enter number 1: 1
Enter number 2: 2
Enter number 3: 3
Enter number 4: 4.5
Enter number 5: 5.6
Enter number 6: 6
Enter number 7: 7
Enter number 8: 8
Enter number 9: 9
Enter number 10: 10
```

The mean is 5.61

The standard deviation is 2.998

Question 05 (This includes Part A and B both):

A client wishes to build a software that does has three functionalities shown below.

Requirement A: I want to store the characters of the Sinhala Alphabet.

Requirement B: A theatre has 30 seats. I wish to store the name of the person who booked a seat.

Requirement C: I have many friends. I wish to store the email and telephone numbers of five of my friends for today.

To satisfy the storage requirements, you are only allowed to use List, Tuple, Dictionary.

- a) For each requirement, write down what you will select giving a reason for your choice. You can use the comment symbol on the python code file to write the answer. Then declare the selected python variable with sample values. **(12 marks)**
- b) Write a python program to satisfy Requirement C. The user must be able to input the data of five friends. The program should store the data using the variable you had selected. You will need to display the collected data at the end. **(8 marks)**