

Name			
Student ID			
Assessment Venue		Seat Number	

## C105 Introduction to Programming

### AY2019 Semester 2 Mid-Semester Assessment (MSA)

#### Instructions to student:

- 1) Do not turn over this question paper until you are instructed to do so by the invigilator.
- 2) Write your name, student ID, assessment venue and seat number in the table provided at the top of this page.
- 3) For this question paper, there are **11** pages (including this cover page).
- 4) For this assessment, you are allowed to:
  - Refer to materials stored in your laptop.
  - Have a blank piece of paper for rough working purpose. (Note that the sheet of rough working paper will not be accepted for submission at the end of the assessment.)
  - Refer to paper-based notes (in bound form, and no larger than A4 size) during the assessment.
- 5) For this assessment, you are **NOT** allowed to:
  - Share any material, such as calculators, with another student.
  - Communicate with any person other than the invigilator.
  - Use any communication devices such as handphone or smart watches while at the assessment venue.
- 6) All rules and regulations pertaining to summative assessments and academic integrity stated in the Student Handbook shall also apply.

<i>This segment is to be used by staff grader(s) only.</i>		
Question Number	Marks Awarded	Max Marks
1		5
2		4
3		6
4		4
5		1
6		3
7		5
8		6
9		6
<b>Total</b>		<b>40</b>

<b><i>This segment is to be used by the invigilator only and for 'online' and 'online and paper' mode assessments only.</i></b>		
Please tick the box below if the student has done part of the assessment online:	Invigilator's Name:	Invigilator's Signature:
<input type="checkbox"/> Partially done online		

## SECTION A – 6 MARKS

### Question 1 [5 marks]

Given the mathematical formula below, write a program that will ask a user to enter integer values for  $X$  and  $Y$  and calculate and display the result of the calculation.

$$X^2 + 2XY + Y^2$$

Some samples of the expected program output are shown below:

Enter X:   
Enter Y:   
Result is 4

Enter X:   
Enter Y:   
Result is 25

## Question 2 [4 marks]

A crate can hold up to 50 strawberries. Write a program that will ask a farmer to enter the number of strawberries harvested. The program then calculates and displays the number of crates that the farmer will need.

Note: One of the crates may hold less than 50 strawberries. For example, if a farmer has 55 strawberries, he needs 2 crates. One crate holds 50 strawberries and the last crate will hold the remaining 5 strawberries.

Some samples of the expected program output are shown below:

```
Enter number of strawberries: 3024
Number of crates required is 61
```

```
Enter number of strawberries: 1995
Number of crates required is 40
```

### Question 3 [6 marks]

A subject scoring system gives a score for each subject taken by a student based on the raw mark obtained for the subject as follows:

Range of Raw Marks Obtained for a Subject	Score Given to the Subject
75 to 100	1
30 to 74	2
Less than 30	3

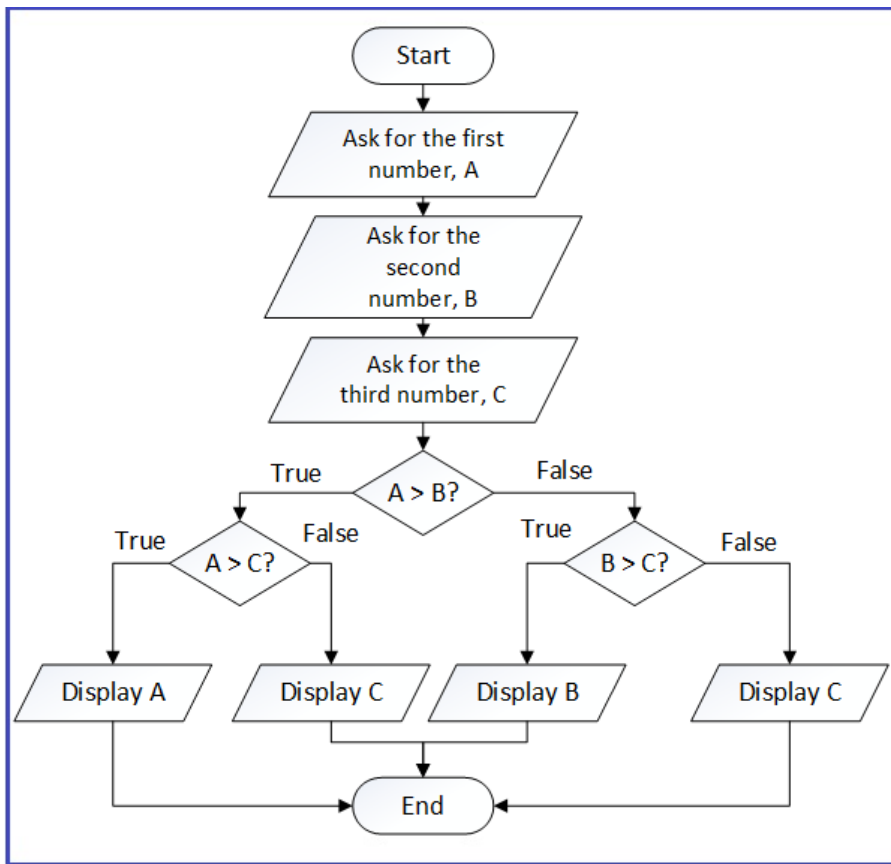
Write a program that will ask a student to enter the raw marks obtained for four (4) subjects using a **for** loop and display his total subject score after that.

A sample of the expected program output is shown below:

```
Enter raw mark for subject 1:65
Enter raw mark for subject 2:89
Enter raw mark for subject 3:25
Enter raw mark for subject 4:40
Total Score: 8
```

## SECTION B – 9 MARKS

Answer the next THREE (3) questions based on the flowchart given below.



**Question 4 [4 marks]**

Write the program based on the flowchart provided.

*Important: Any code which is structured differently from the flowchart will be penalised.*

**Question 5 [1 mark]**

Describe the purpose of the program.

**Question 6 [3 marks]**

To ensure the program works correctly, it needs to be tested with various test cases. Complete the table below with test cases that will ensure **all branches of the program are tested**. One of the test cases is provided in the table already.

Inputs (Test Data)			Expected Output
A	B	C	
3	2	1	A
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## SECTION C – 11 MARKS

When calculating the age of a cat in human years, it is generally agreed that:

- In its first year, a cat is equivalent to the age of a fifteen (15) years old human.
- In its second year, a cat is equivalent to the age of a twenty-four (24) years old human.
- From the third year onwards, a cat will age at a rate of four (4) human years each year.

### Question 7 [5 marks]

Write a function named **calCatAge** that accepts one integer parameter named **catAge**. Given **catAge**, which represents the age of the cat, the function calculates and returns the age of the cat in human years.

Some sample outputs of the function, when executed from Python Shell, are shown below.

```
>>> calCatAge(0)
0
>>> calCatAge(1)
15
>>> calCatAge(2)
24
>>> calCatAge(3)
28
>>> calCatAge(4)
32
```



### Question 8 [6 marks]

Write a program that allows a user to enter the age of 5 cats using a **while** loop. The program will calculate and display the average age of the 5 cats in human years after that.

The program must use or call the function **calCatAge** created in the previous question.

A sample of the expected program output is shown below:

```
Enter cat's age: 2
Enter cat's age: 1
Enter cat's age: 3
Enter cat's age: 1
Enter cat's age: 4
The average age of the 5 cats in human years is 22.8
```

## SECTION D – 6 MARKS

### Question 9 [6 marks]

A shop tags all its products using a product code with the following format: **X-Y-Z**

**X**, **Y**, and **Z** are numbers separated by a dash (-), and each number must be between 1 and 255.

Examples of the valid product codes are: 12-200-111, 14-100-144.

Examples of invalid product codes are: 0-250-111, 1-24-267.

Write a program to allow a user to enter a product code as a String. The program then checks and displays if this product code is a valid code or invalid code.

You can assume that a user will **not** enter e.g. 00-111 (only 2 numbers) or 00-111-124-444 (more than 3 numbers) or A-10-343 (alphabets and numbers).

Some samples of the expected program output are shown below:

Enter a product code: 12-200-111  
Valid product code.

Enter a product code: 14-100-144  
Valid product code.

Enter a product code: 0-250-111  
Invalid product code.

Enter a product code: 1-24-267  
Invalid product code.

**--- End of Paper ---**