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PART A: STRUCTURED QUESTIONS

QUESTION 1 **[8 MARKS]**

Trace the execution of the flowchart in **Figure 1** by filling in the tracing table in **Table 1**.

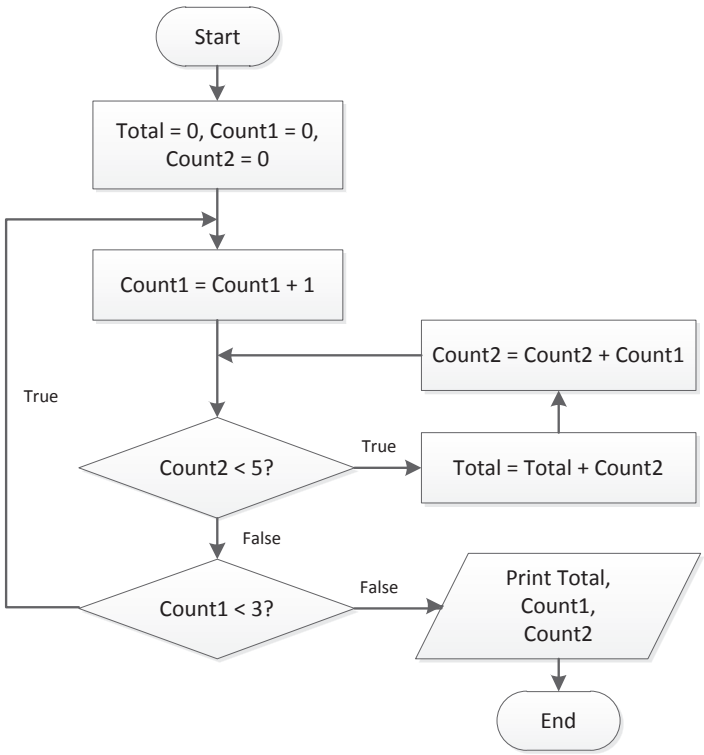


Figure 1: Flowchart

Table 1: Tracing table

Count1	Count2	Total	Count2 < 5	Count1 < 3	Output
0	0	0			
1			True		
	1	0	True		
	2	1	True		
	3	3	True		
	4	6	True		
	5	10	False	True	
2			False	True	
3			False	False	10 3 5

QUESTION 2 **[5 MARKS]**

Determine the output for each run of the pseudo code in **Figure 2** for the given inputs in **Table 2**. Write your answers in **Table 2**.

```
1.  Start
2.  Read m, n
3.  If m is greater than n
    3.1 If m is greater than 10
        3.1.1 If n is greater than 10
              3.1.1.1 x = m / 5 * n
        3.1.2 Else
              3.1.2.1 x = m + n
        3.1.3 End_If
    3.2 Else
        3.2.1 x = m * n
    3.3 End_If
4.  Else
    4.1 If m is equal to n
        4.1.1 x = (m + n) / 2
    4.2 Else
        4.2.1 x = 0
    4.3 End_If
5.  End_If
6.  Print x
7.  End
```

Figure 2: Pseudo code

Table 2: Tracing table

m	***n***	**Output**
12	5	17
15	10	25
5	17	0
8	8	8
20	15	60

QUESTION 3 **[11 MARKS]**

The flowchart in **Figure 3** represents a nested loop to collect data and calculate the average rainfall over a period of years. First, the program should ask for the number of years. The outer loop will iterate once for each year. The inner loop will iterate 12 times for each year. Each iteration of the inner loop will ask the user for the inches of rainfall for that month. After all iterations, the program should display the number of months, the total inches of rainfall, and the average rainfall per month for the entire period.

Input Validation: Do not accept a number less than 1 for the number of years. Do not accept negative numbers for the monthly rainfall.

Fill in the blank graphical symbols with question mark (?) and roman numbers in **Figure 3** with appropriate instructions. Write your answers in **Table 3**.

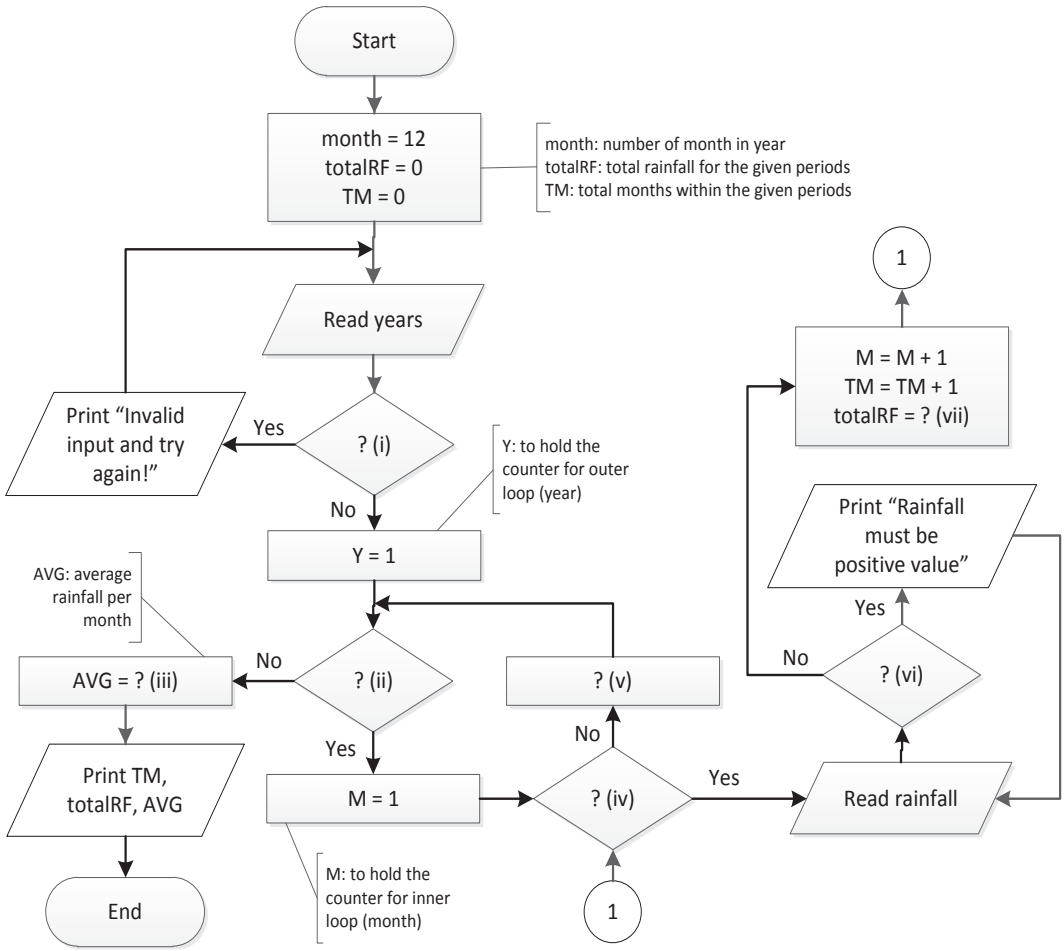


Figure 3: Flowchart

Table 3

Question	Instruction
(i)	years < 1
(ii)	Y <= years
(iii)	AVG = totalRF / TM
(iv)	M <= month
(v)	Y = Y + 1
(vi)	rainfall < 0
(vii)	totalRF = totalRF + rainfall

QUESTION 4 **[6 MARKS]**

Mr. Akmal owns a used vehicle business, which covers both used car and used superbike. He is planning to hold a promotion to improve the sales of recent years vehicles. He employed a programmer to create a program that will calculate the discounted price of vehicle, as shown in following flowchart in **Figure 4**. Trace the output of the program based on following inputs in **Table 4**. Write your answers in **Table 4**.

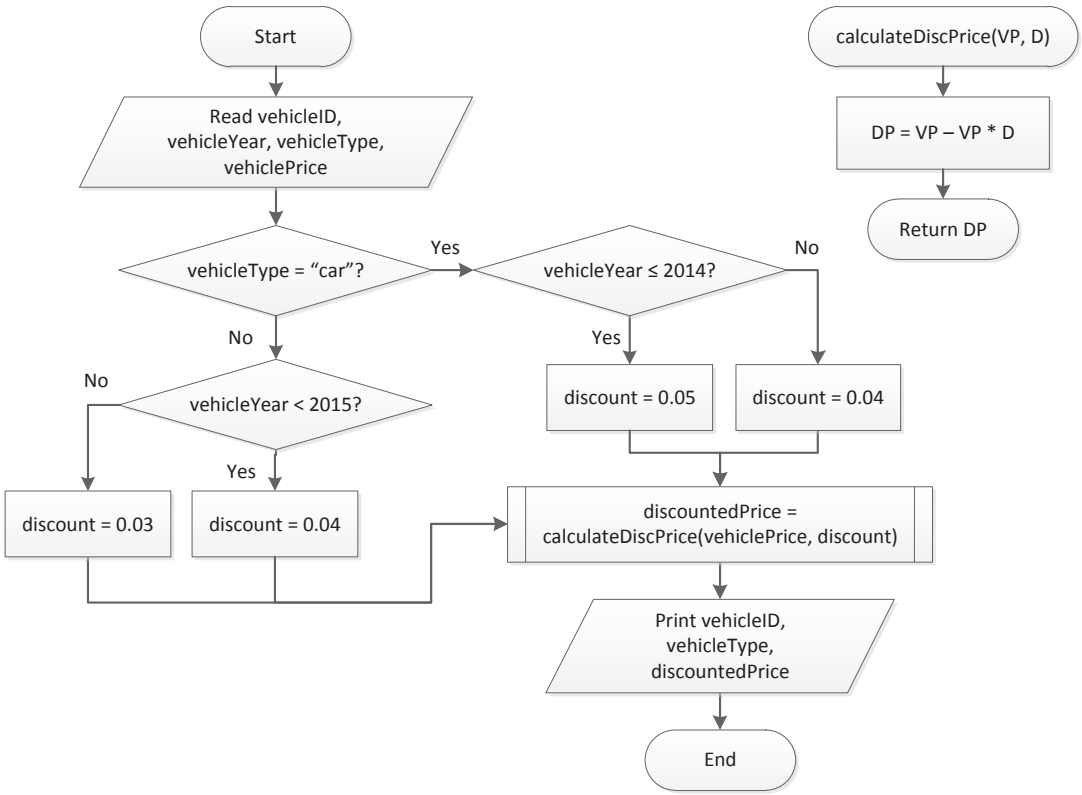


Figure 4: Flowchart

Table 4: Tracing table

No	vehicleID	vehicleYear	vehicleType	vehiclePrice (RM)	discount	discountedPrice (RM)
1.	V0001	2015	superbike	18,000.00	0.03	17460
2.	V0002	2012	car	55,000.00	0.05	52250
3.	V0003	2014	car	43,000.00	0.05	40850
4.	V0004	2014	superbike	21,000.00	0.04	20160
5.	V0005	2016	car	63,000.00	0.04	60480

QUESTION 5 **[14 MARKS]**

Trace the execution of the flowchart in **Figure 5** and **Figure 6** by filling in the tracing tables in **Table 5** and **Table 6** accordingly.

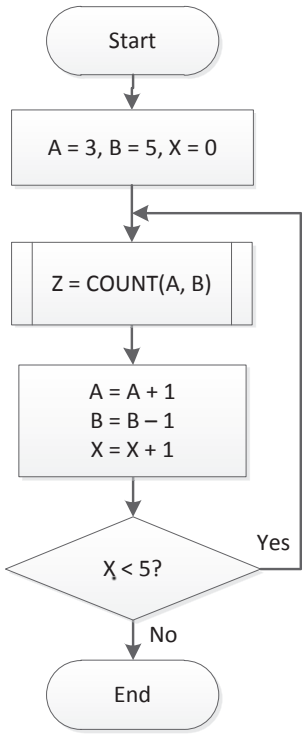


Figure 5: Flowchart 1

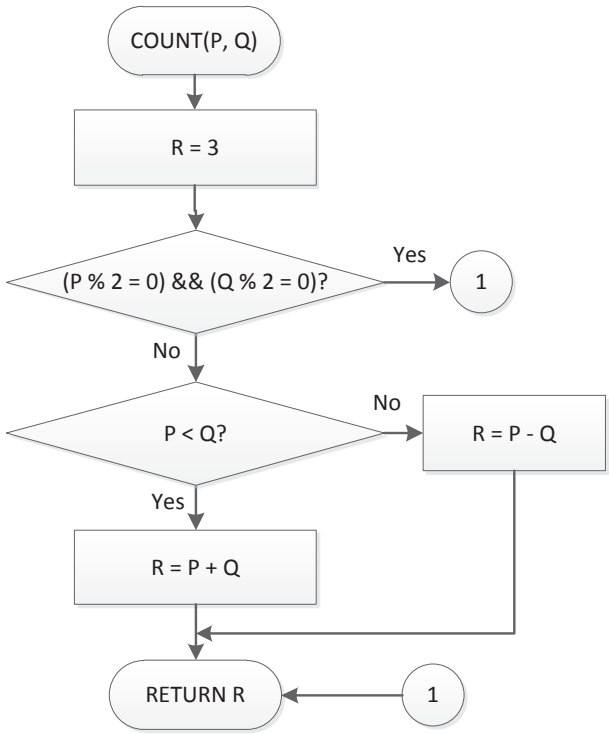


Figure 6: Flowchart 2

Table 5: Tracing table 1

A	B	X	X<5	Z
3	5	0		8
4	4	1	Yes	3
5	3	2	Yes	2
6	2	3	Yes	3
7	1	4	Yes	6
8	0	5	No	

Table 6: Tracing table 2

P	Q	R	(P % 2 = 0) && (Q % 2 = 0)	P<Q
3	5	8	No	Yes
4	4	3	Yes	
5	3	2	No	No
6	2	3	Yes	
7	1	6	No	No

QUESTION 6 **[7 MARKS]**

Trace the variables of the flowchart in **Figure 7** using the following input values:

	number	unit
(i)	0	250
(ii)	1	3500
(iii)	2	500
(iv)	3	5000
(v)	4	3000

Write your answers in **Table 7**.

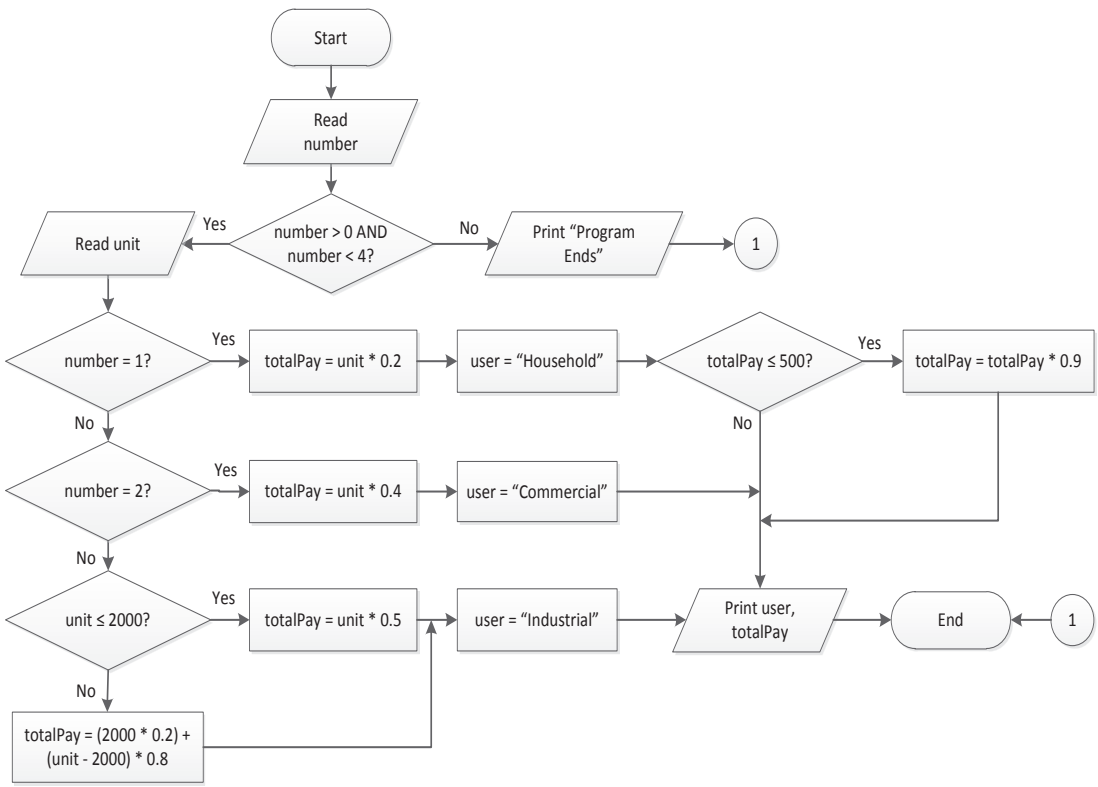


Figure 7: Flowchart

Table 7: Tracing table

No	number	totalPay	Output
(i)	0	-	Program Ends
(ii)	1	700	Household, 700
(iii)	2	200	Commercial, 200
(iv)	3	2800	Industrial, 2800
(v)	4	-	Program Ends

QUESTION 7 **[15 MARKS]**

Draw a flowchart which reads in two integer values. Then, display all the numbers that is located between the two numbers. Please consider the following conditions:

a) If the first number entered is smaller than the second number entered, print all numbers in ascending order by using a **pre-test** loop.

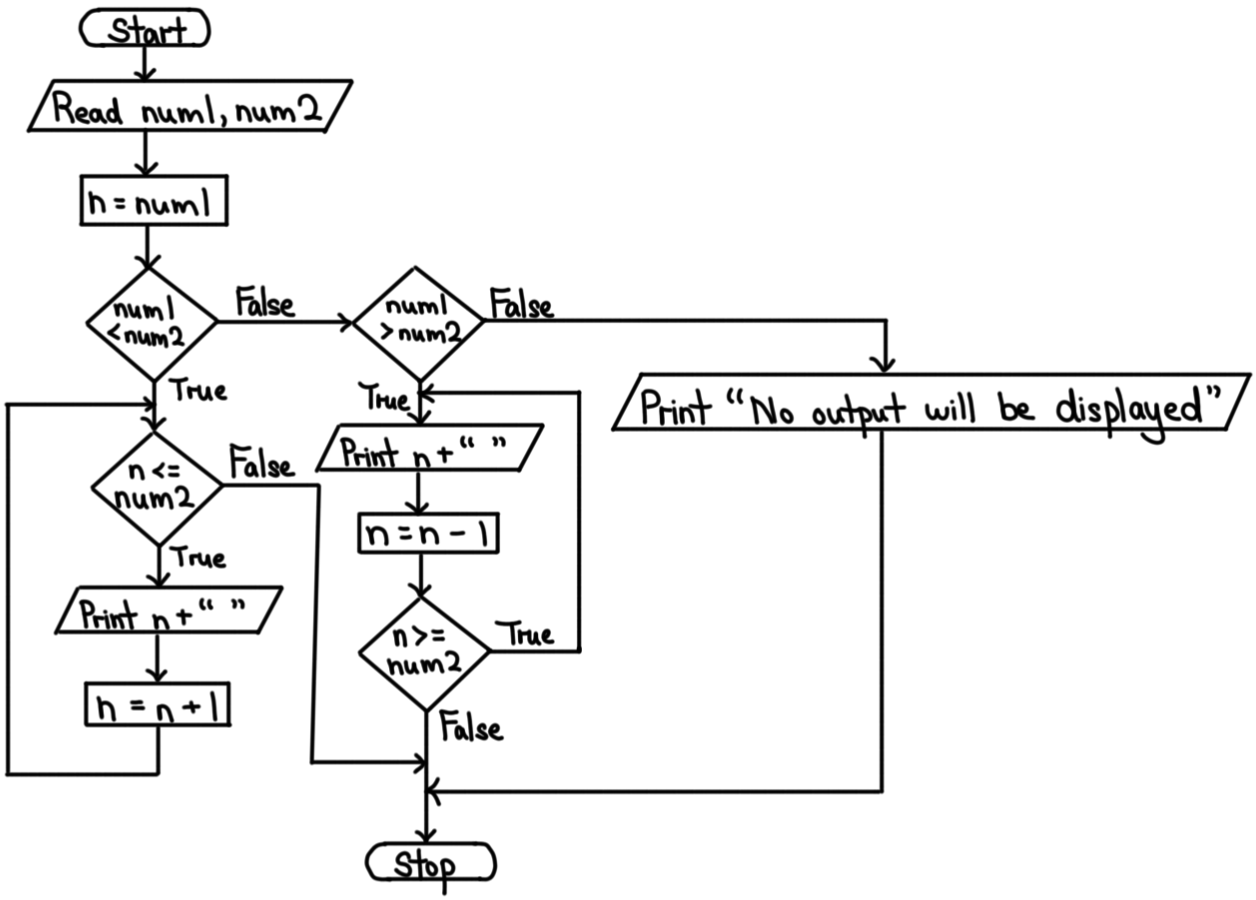
b) If the first number entered is greater than the second number entered, print all numbers in descending order by using a **post-test** loop.

Table 8 shows an examples of input and output. The user's input is shown in **bold**.

Table 8: Examples of input and output

Example	Input	Output
1	**3 8**	3 4 5 6 7 8
2	**15 12**	15 14 13 12
3	**4 4**	*No output will be displayed*
4	**19 23**	19 20 21 22 23

(Space for Answer of Part A: Question 7)



PART B: PROBLEM SOLVING

QUESTION **[34 MARKS]**

Using flowcharts, design the algorithm for a program based on the problem given. Develop a program that asks the user to enter a distance in meters. The program will then present the following menu of selection:

1. Convert to kilometres
2. Convert to inches
3. Convert to feet
4. Quit the program.

The program will convert the distance to kilometres, inches, or feet, depending on the user's selection. Here are the specific requirements:

a) Draw the flowchart for a function named *showKilometers*, which accepts the number of meters as an argument. The function should display the argument converted to kilometres. Convert the meter to kilometres using the following formula :

kilometres = meters × 0.001

b) Draw the flowchart for a function named *showInches*, which accepts the number of meters as an argument. The function should display the argument converted to inches. Convert the meter to inches using the following formula :

inches = meters × 39.37

c) Draw the flowchart for a function named *showFeet*, which accepts the number of meters as an argument. The function should display the argument converted to feet. Convert the meter to feet using the following formula :

feet = meters × 3.281

d) Draw the flowchart for a function named *displayMenu* that displays the menu of selection. This function should not accept any arguments.

e) The program should continue to display the menu until the user enters **4** to quit the program.

f) The program should not accept negative numbers for the distance in meters.

g) If the user selects an invalid choice from the menu, the program should display an error message.

Figure 8 is an example session with the program, using console input. The user's input is shown in **bold**.

```
Enter a distance in meters: 500 [Enter]

1. Convert to kilometres
2. Convert to inches
3. Convert to feet
4. Quit the program.

Enter your choice : 1 [Enter]

500 meters is 0.5 kilometers.

1. Convert to kilometres
2. Convert to inches
3. Convert to feet
4. Quit the program.

Enter your choice : 3 [Enter]

500 meters is 1640.5 feet

1. Convert to kilometres
2. Convert to inches
3. Convert to feet
4. Quit the program.

Enter your choice : 10 [Enter]

ERROR! Invalid Input.

1. Convert to kilometres
2. Convert to inches
3. Convert to feet
4. Quit the program.

Enter your choice : 4 [Enter]

BYE!
```

Figure 8: Example of inputs and outputs

(Space for Answer of Part B)

(Space for Answer of Part B)