TUTORIAL 1-2 (SECJ1013)

PROGRAMMING TECHNIQUE 1

SECTION 04 & 07, SEM 1, 2024/2025

Q#1

Based on the following pseudo code in **Figure 1**, complete the trace table given in **Table 1**. Data to be used for this problem is:

noItems	itemID	CP	SP	units
3	1111	32	40	10
	2222	25	30	5
	3333	57	65	2

```
1. Start
2. Set Total to 0
3. Read noItems
4. While (noItems Is Not 0)
    4.1 Read itemID, CP, SP, units
    4.2 P = (SP * units) - (CP * units)
    4.3 Add P to Total
    4.4 Print itemID, P
    4.5 Subtract 1 from noItems
5. End_While
6. Print Total
7. End
```

Figure 1: Pseudo code

Table 1: Tracing table

noItems Is not 0

Total	noItems	P	Output
0	3	80	1111, 80
80	2	25	2222, 25
105	1	16	3333, 16
121	0		121

Q#2

Trace the flowchart below in **Figure 2** by fill in the table given in **Table 2**.

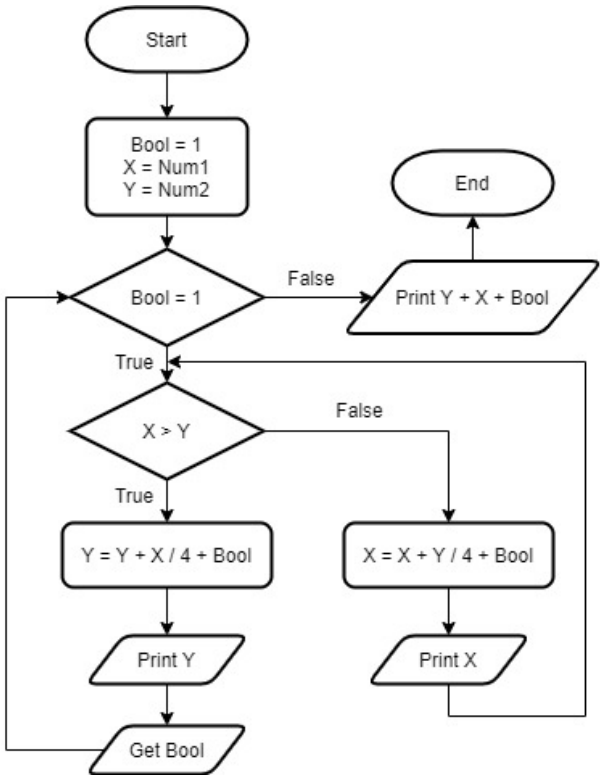

Figure 2

Table 2

Num1	Num2	Bool	X	Y	Output
7	8	**1** 1 2	7 10 10	8 8 11.5	10 11.5 23 21.5
23	5	**1** 1 -5	23 23 23	5 11.75 18.5	11.75 18.5 36.5
32	23	**1** 1 1 10	32 32 41 41	23 32 32 43.25	32 41 43.25 94.25

****Bold** value for Bool is the initial value for Bool*

Q#3

A new highway has been built between Taman Pulai Indah to Johor Bahru. During normal hours, the toll fee rate is RM3 for each kilometre. However, at peak hours (i.e., between 8 am to 9 am, and 4 pm to 5 pm, the rate is RM 4 for each kilometre. Design a flowchart to calculate the toll fee.

Q#4

The purpose of the flowchart in **Figure 3** is to find the smallest and largest values for 20 percentage scores. Fill in the blank graphical symbols in Figure 3 with appropriate instructions.

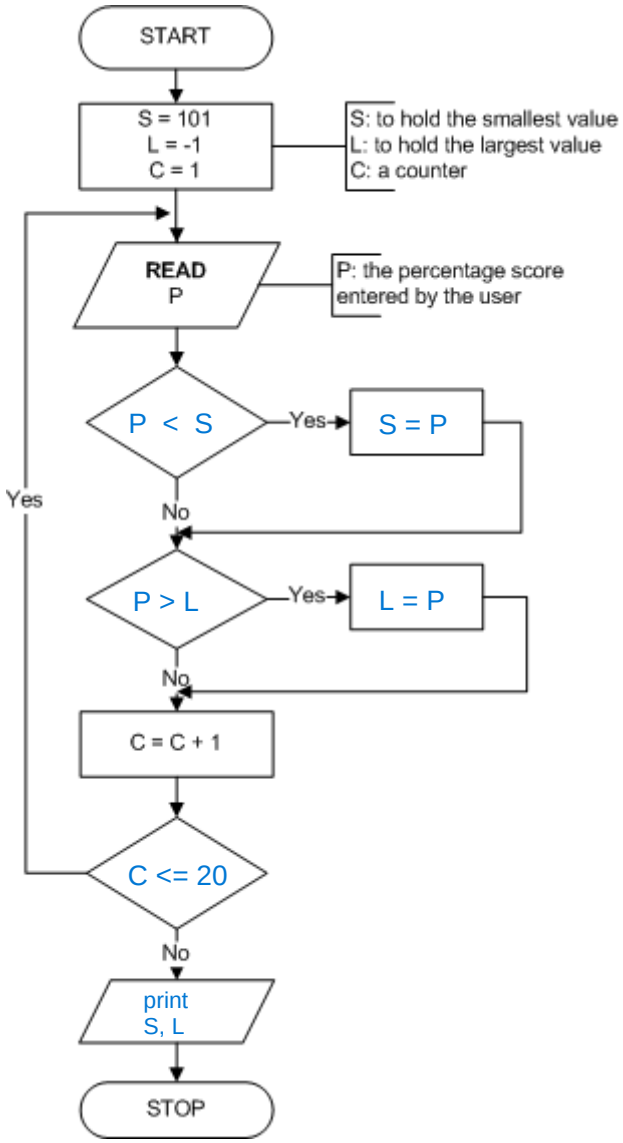

Figure 3

Q#5

Trace the execution of the flowchart in **Figure 4** and **Figure 5** by filling in the tracing tables in **Table 3** and **Table 4** accordingly.

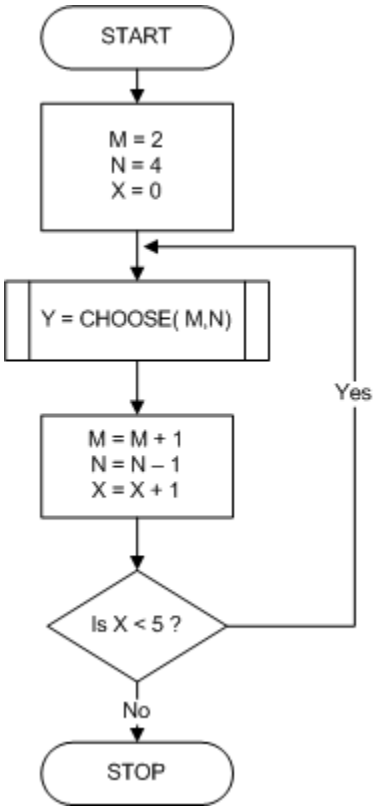

Figure 4

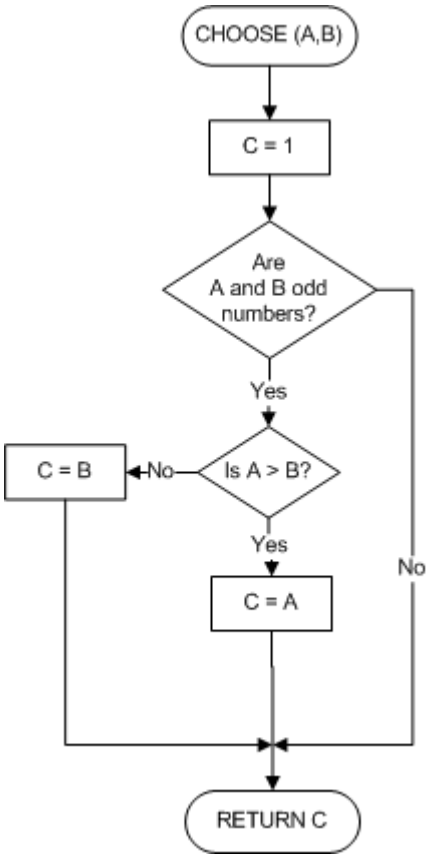

Figure 5

Table 3

M	N	X	X<5?	Y
2	4	0	true	

Table 4

A	B	C	A & B odd?	A>B?

Q#6

a. Using a pre-test loop, design a flowchart, to print the sum of numbers. The summation is based on how many numbers to be added determined from the user input. The sample output is as given in **Figure 6**.

```
How many numbers are to be added? 3
Enter a number? 10
Enter a number?  5
Enter a number?  2

The sum is 17
```

Figure 6

b. Using a post-test loop, design a flowchart, to print the sum of numbers. The summation is based on the sentinel value. **Figure 7** shows a sample output of the algorithm, where the sentinel value of "0" is used to end the loop.

```
Enter a number, or "0" to end? 2
Enter a number, or "0" to end? 1
Enter a number, or "0" to end? 1
Enter a number, or "0" to end? 2
Enter a number, or "0" to end? 3
Enter a number, or "0" to end? 0

The sum is 9
```

Figure 7

Notes: *Font in* ***bold*** *is the input of the program***.**

Q#7

Suppose there is an algorithm to multiply the integers from *X* to *Y*, where *X* and *Y* are the starting and ending numbers specified by the user. Note that, *X* might be less than or equal to *Y*, or vice versa. **Table 5** shows the outputs of the algorithm for specified inputs.

Table 5

Input		**Output**
X	**Y**	
2	5	120 *(i.e., 2 x 3 x 4 x 5 = 120)*
5	5	5
9	7	504

The algorithm consists of two flowcharts, the main flowchart and a function flowchart named PRODUCT, as shown in **Figure 8 and Figure 9,** respectively**.** The purpose of the function PRODUCT is to perform the multiplication. Fill in the blank graphical symbols in **Figure 8** and **Figure 9** with appropriate instructions.

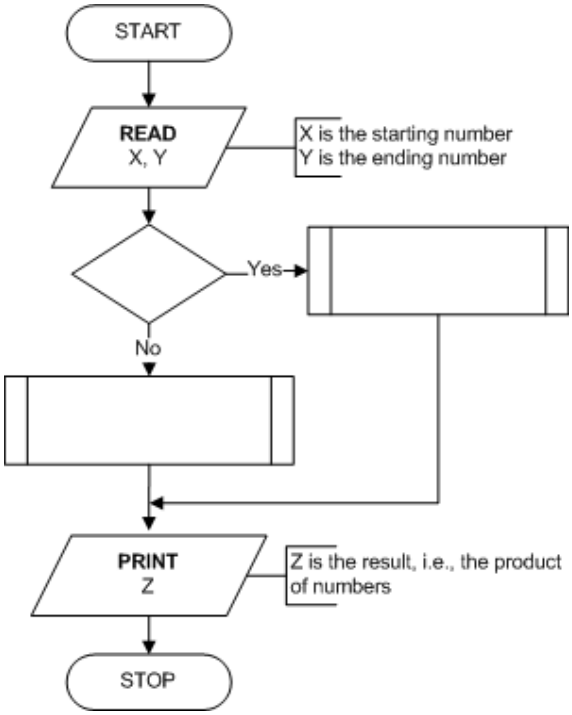

Figure 8

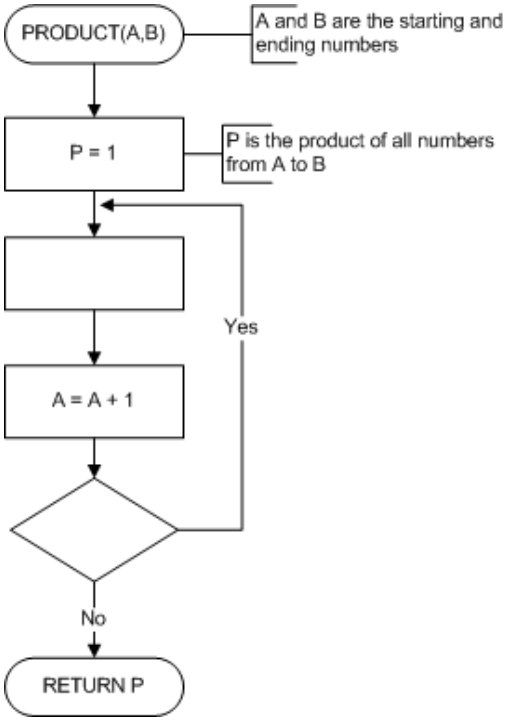

Figure 9

Q#8

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 10**. Trace the output of the program based on following inputs in **Table 6**. Write your answers in **Table 6**.

Table 6: Tracing table

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

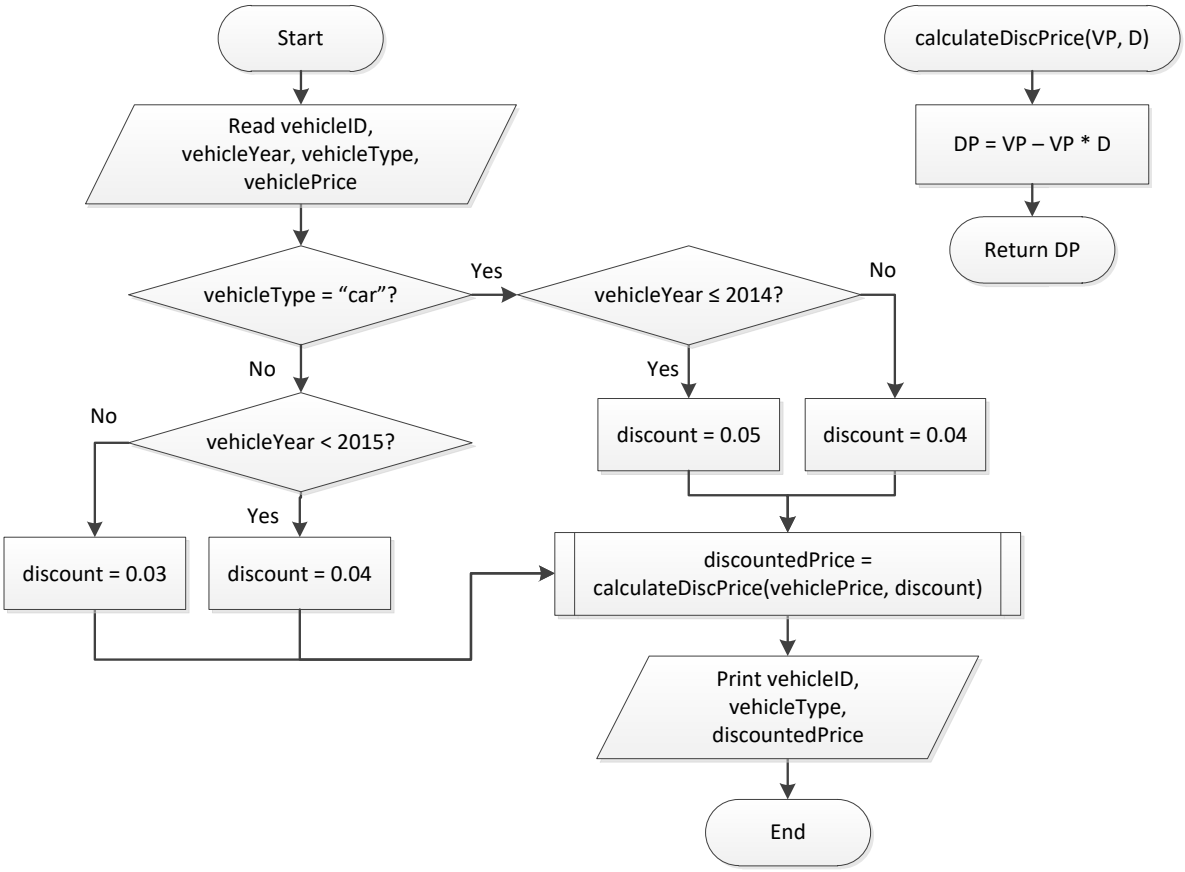

Figure 10: Flowchart

Table 4: Tracing table

No	vehicleID	vehicleYear	vehicleType	vehiclePrice (RM)	discount	discountedPrice (RM)
6.	V0001	2015	superbike	18,000.00		
7.	V0002	2012	car	55,000.00		
8.	V0003	2014	car	43,000.00		
9.	V0004	2014	superbike	21,000.00		
10.	V0005	2016	car	63,000.00		

Q#9

Mode Auto Dealer is a used car business owned by Mr. Muhammad. He employs you to develop a program that will calculate the sales discount to be applied to a vehicle, based on its year of manufacture and type. The discount is extracted from a two-dimensional table as in **Table 5** below:

Table 5

Year of manufacture	Discount Percentage		
	Small	Medium	Luxury
	1	2	3
2017	0.05	0.06	0.07
2018	0.03	0.04	0.05
2019	0.01	0.02	0.03

The year of manufacture of the vehicle is divided into three categories (2017, 2018 and 2019), and the type of car is divided into three categories (small, medium and luxury). No discount is given for a vehicle older than 2017. Your program is to read the vehicle file, which contains the customer number and name, the make of car, year of manufacture, car type code (1, 2, or 3) and the sales price. Use the year of manufacture and the car type code as guidelines to retrieve the discount percentage table, then apply the discount percentage to the sales price to determine the discounted price of the vehicle. Print all the details including discounted price. Before writing the program you are required to plan your problem solving steps in a flowchart(s).

Q#10

Sunshine is a self-service printing center that provides a photocopy services to UTM students. This center uses 2 sizes of paper; A4 and B5. The photocopy charge for A4 size paper is 6 cents each for the first 10 copies. However, the customer will receive 35% discount of the total charge if the number of copy is exceeded 10 copies but less than 50 copies. If the number of copies is 50 and more, then each copy will be charged 3 cents. Whilst, the photocopy charge for B5 size is 5 cents each for less than 50 copies and 3 cents each for 50 copies and more. The Sunshine owner also needs to prepare certain amount of paper every morning before opening his photocopy center. Therefore, he would like to know the total number of paper A4 and B5 papers used at the end of the day. You are asked by the Sunshine owner to design a simple calculator program that serves his need. Note that, a customer may also use both paper sizes for photocopy. List all possible **input** and **output** required in the program and **draw a flowchart** for this calculator.