COMPUTER SCIENCE PROGRAM
FACULTY OF COMPUTING AND INFORMATICS
UNIVERSITI MALAYSIA SABAH

KT14303 PROGRAMMING PRINCIPLES
Lab 02 Fundamental Data Types

Student Matric No :	
Student Name:	
Program:	**HC00/ HC05 / HC14**

Learning Objectives/Outcomes:
Upon completion of this lab, the student should be able to:

i. define primitive data types, declare and initialize a valid variables and constants
ii. write arithmetic expressions and assignment statements in C++
iii. write a program that read and process input, and displays the result as console output
iv. write a program that process strings with the use of standard C++ string type

INSTRUCTION: ANSWER ALL QUESTIONS

Practice 1: Working with SmartV3 system (Estimate 15 minutes to 30 minutes)
After studying the population growth of Sabah in the last decade of the 20th century, we have modeled Sabah's population functions as

$$P(y) = 53.966 + 2.184y$$

Where y is a years after 1990, and P is population in thousands. Thus, P(0) represents he population in 1990, which was 53.966 thousand people. Write a program to predict Sabah's population in the year provided as input argument as Sample Run below.

Sample Run 1 :

```
POPULATION GROWTH ESTIMATION
********************************

Enter a year after 1990: 2022
Predicted Sabah state population for 2022 (in thousands): 123.854
```

Sample Run 2:

```
POPULATION GROWTH ESTIMATION
********************************

Enter a year after 1990: 2050
Predicted Sabah state population for 2022 (in thousands): 185.006
```

Practice 2: (Estimate 15 minutes to 30 minutes)
Write a program that prompts the user to enter a positive integer ranging from 0 to 65535. Subsequently, write an algorithm to break the entered integer into a sequence of individual digits and then prints them vertically (each on one line), first forward and then reversed (the last one first), as shown in the following design:

SAMPLE RUN 1:

```
Please enter a positive integer between 0 and 65535 : 54321
The forward sequence: 5 4 3 2 1


The reversed sequence: 1 2 3 4 5
```

SAMPLE RUN 2:

```
Please enter a positive integer between 0 and 65535 : 32124
The forward sequence:3 2 1 2 4


The reversed sequence:4 2 1 23
```

Practice 3: (Estimate 30 minutes to 60 minutes)
Write a C++ program that creates customer's bills for a carpet company when the following information is given :

i. the length and the width of the carpet in feet
ii. the carpet price per square foot
iii. the percent discount for each customer

The labor cost is fixed at RM5.50 per square foot. It is to be defined as a constant. The tax rate is 5.5% applied before the discount. It is also to be defined as a constant. The input data consist of a set of three integers presenting the length and width of the room to be carpeted, the percentage of the discount the owner gives to a customer, and a real number representing the unit price of the carpet. The program is to prompt the user for this input as shown below.

Sample Run :

```
Length of room(feet) =>   30
Width of room(feet)=> 18
Customer discount (percent)=> 10
Cost per square foot (XXX.XX) => 8.99
```

Sample Output :

```
                              FCI Sdn. Bhd
                              80, Jln UMS,
                        88400, Kota Kinabalu, Sabah
MEASUREMENT

 Length          30.00 ft
 Width           18.00 ft
 Area            540.00 square ft

CHARGES

DESCRIPTION          COST/SQ.FT           CHARGE
-------------        ----------          ------------
Carpet                RM 8.99            RM   4854.60
Labor                 RM 5.50            RM   2970.00
                                         ------------
                        SUB TOTAL    :   RM   7824.60
                                         ------------
                        DISCOUNT(10%):   RM    782.46
                        GST (6.00%)   :  RM    469.48
                                         ------------
                        TOTAL        :   RM   7511.62
```

The program's design should use the main function to complete the following tasks:

i. Read data from the keyboard. This function is to use addresses to read all data and place them in the calling function's variables.
ii. Calculate and print the subtotal price, including the mathematical formula to calculate area, carpet cost and labor cost.
iii. Calculate and print the discount price on company offers.
iv. Calculate and print Tax price based on a constant of 5.5%
v. Calculate and print the total price with discount and tax.
vi. Print the company header and measurements.

********** **THE END** **********