Algorithms and data structures
Tutorial 1

Follow the below guide:

- After a labwork, you will have one week (or 7 days) to complete all exercises. All submissions must be sent before 23:59 of the day before the next labwork day.

- Compress all code source files in a zip file and rename it as FULLNAME-ID-TT#no.zip (e.g NguyenVanA-070-TT1.zip). Save your files according to the exercise number i.e Ex1.cpp, Ex2.c, etc. Incorrect filenames will result in no score for the respective exercises.

- Only code source files (.c or .cpp) should be in the zip files. Other files (.exe, .o) MUST be removed from the zip file.

- Send to this email: doan-nhat.quang@usth.edu.vn

- Copy/Paste from any source is not tolerated. Penalty will be applied for late submission.

- NOTE: You must follow the guide. Incorrect zip file name, zip files containing other files (.exe), copy/paste lead to heavy penalty.

Exercise 1:
Write a program to add two variables of any data type using references and/or pointers.

Exercise2:
Write a program to calculate the sum of an array of n elements declared with any data type using references and/or pointers.

Exercise 3:
Define a structure Point to describe a coordinate point (x,y). Write a program to compute the Euclidean distance between two Points.

Exercise 4:
Use the structure Point defined in the previous exercise to define a Rectangle. A rectangle can be determined by two points $P1(x_1, y_1)$ and $P2(x_2, y_2)$ as in the following figure:

P1 (x₁,y₁)   P1' (x₁,y₂)

P2'(x₂,y₁)   P2 (x₂,y₂)
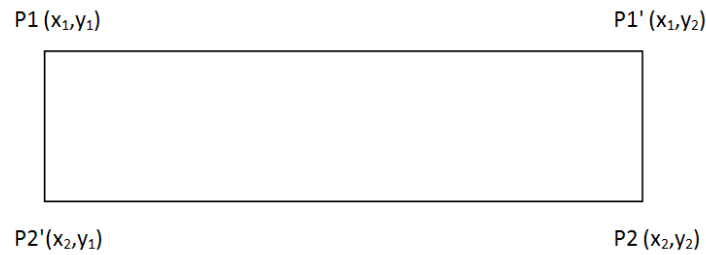
Write a function to verify whether a rectangle can be constructed from the two given points. If we cannot construct a rectangle, re-enter new two points. If we can get a rectangle, calculate its area.
Write a function that returns 1 if a point falls within a rectangle, 0 otherwise.

Exercise Bonus:
Calculate the check digit represented with "?" for each of the following International Standard Book Numbers.

- ISBN: 4-08-858734-?

- ISBN: 4-08-872271-?

ISBN is constructed by 10 digits. The first 9 digits are actual codes, and the last digit (which is called the check digit) is used for checking whether the other digits are correct or not. The check digit is a remainder of dividing a control number by 11.

$$4\text{-}0 \quad 8\text{-}8 \quad 7 \quad 3 \quad 1 \quad 0 \quad 4\text{-}2$$
$$\times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times$$
$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad \% \, 11$$
$$4 + 0 + 24 + 24 + 35 + 18 + 7 + 0 + 36 = 156$$