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.

- 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 (no score).

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

Exercise 2: Write a program to concert a decimal number into a binary number and a hexidecimal number.
Example: 85 → 1010101 (binary), 85 → 55 (hexadecimal)

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 (x_1, y_1) P1' (x_1, y_2)

P2' (x_2, y_1) P2 (x_2, y_2)
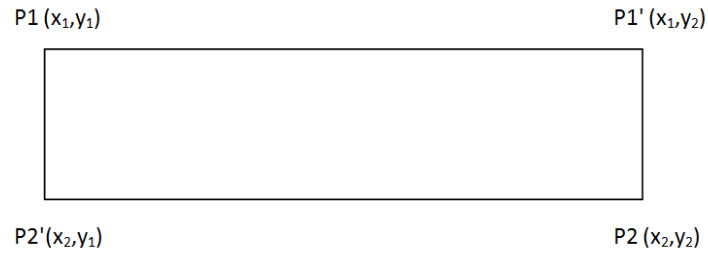
Write a function to verify whether a rectangle can be constructed from the two given points. If we cannot construct a rectangle, re-enter new two points. If we can get a rectangle, calculate its area.

Write a function that returns 1 if a point falls within a rectangle, 0 otherwise.