

# 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, multiplication two variables of any data type using pass by references.

### Exercise2:

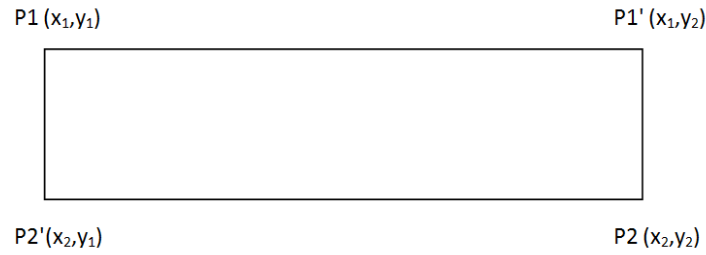
Write a program to calculate the sum of an array of n elements declared with any data type using references and/or pointers.

### 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:



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:**

Write a program to enter an integer  $n$  and perform a prime factorization.