

# Algorithms and data structures

## Labwork 4 - Recursion

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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 in C/C++ that uses only addition, subtraction, and comparison to multiply two interger numbers using recursion.

### Exercise 2:

Write a program in C/C++ to find prime numbers from 1 to n using recursion (with iteration if necessary) where n is a natural number.

### Exercise 3:

Write a recursive function in C/C++ that calculates the sum of all elements in a Linked List.

#### Exercise 4:

Write a recursive function in C/C++ that finds the least bills of a given money amount. We suppose that there are 6 different bills in the currency system: 1\$ bill, 2\$ bill, 5 \$ bill, 10\$ bill, 20\$ bill, 50 \$ bill.

#### Exercise Bonus:

Write a program in C/C++ to solve the Hanoi tower using Stacks with the Linked List implementation. The mission is to move all the disks to some another tower without violating the sequence of arrangement and with few rules as following:

- Only one disk can be moved among the towers at any given time.
- Only the top disk can be removed.
- No large disk can be put over a small disk.

