# Lab1 – Basic Algorithm & Graph Practice

# Deadline: 2020/10/18

**Lab1 Introduction**

This is an exercise lab to review simple algorithms and data structure. It is strongly recommended to familiarize with Standard Template Library (STL) and basic graph algorithm in this lab.

**Input**

The given input will be a list of node connection. You can *(but not required)* refer to Algorithm Textbook(3rd Edition).

The list will provide the following information:

1. Name of the source node
2. Name of the target node
3. A list of node connection with integer value weight (or edge cost)

**Example (input.txt):**

```
source: s
target: z
s  z  2
t  s  6
t  x  -2
y  s  7
y  t  8
x  t  5
x  y  -3
x  z  7
z  t  -4
x  y  9
```

**Output**

You will need to produce **2** output file. First one is **single source shortest path** problem, second one is the **max flow minimum cut**.

1. For **shortest path problem**, you should list the cost (distance) travelling from source node to every other node in the graph. It should be name as "short.txt"

**Output Format (short.txt):**

```
s: 0
t: 2
x: 4
y: 7
z: -2
```

2. For **Max-Flow Min Cut Problem**, you should calculate the maximum flow that can be achieved in the graph. (You don't have to deal with input with negative edge).

**Output Format (max.txt):**

```
Max Flow: 23
```

**Reference Textbook**

1. Introduction to Algorithm (3rd Edition).

**Environment**

1. Linux (Please make sure your code is available on our linux server. If it cannot be executed, .zip file, you will get zero point!!)
2. Makefile and Readme should be provided
3. A sample parser, data model code is provided. You may choose to use them or not. The TA cannot guarantee the provided code is free of bugs or defects. **USE THEM AT YOUR OWN RISK!!**

**Evaluation**

1. You **MUST WRITE YOUR OWN CODE.** Copying codes may result you to **FAIL** this course.
2. Naming rule.
   A. Name of the binary after "make" – **Lab1**
   B. Execution procedure: ./Lab1 [input] (Ex. ./Lab1 input1.txt)
   C. Name of the output file
      i. **short.txt**
      ii. **max.txt**
   D. **Not following specified naming rule will receive zero mark**
3. Late submission will **NOT** be accepted.
4. Hidden cases will be evaluated

**Submission**

Please upload the following materials in a .zip file (e.g. Student_ID.zip) to New E3 by the deadline, specifying your student ID in the subject field. (If your submission file is not .zip file, you will get zero point!!)

1. Source code (.cpp, .h).
2. Makefile
3. Executable binary.
4. A Readme file (Information to how to make and execute your code.)