

# Data Structure and Advanced Programming

## Homework #2

Due: 2021/3/16 08:00am (CST)

**NOTE: Please upload your answers in either English or Chinese as a PDF to NTU COOL before the due date and time.**

1. (20%) Consider a bag of integers.
  - a. (10%) Write a client function that computes the sum of the integers in the bag `aBag`.
  - b. (10%) Write a client function `replace` that replaces a given item in a given bag with another given item. The function should return a boolean value to indicate whether the replacement was successful.
2. (20%) Design and implement an ADT (Abstract Data Types) that represents a rectangle. Include typical operations, such as setting and retrieving the dimensions of the rectangle, and finding the area and the perimeter of the rectangle.
3. (60%) In a doubly-linked chain, each node can point to the previous node as well as to the next node. The figure below shows a doubly-linked chain and its head pointer.
  - a. (20%) Define a class to represent a node in a doubly-linked chain.
  - b. (20%) List the steps necessary to add a node to the beginning of the doubly linked chain shown in Figure below.
  - c. (20%) List the steps necessary to remove the first node from the beginning of the doubly linked chain shown in Figure below.

