

\*注意：請於答案卷上依序作答，並註明作答之大題及題號。

**Part I Question and Answer (簡答題) (50%)**

*Instruction: Write brief but complete answer for each of the following questions*

1. (15%) Please briefly explain the concept of Object-Oriented Programming.
2. (15%) Please describe an approach and its logical steps for sorting an array of integers.
3. (20%) Please describe the logical steps for printing out the first  $n$  numbers of the Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, ..., in which each element (beyond the first and second) is the sum of the previous two elements.

**Part II Programming (程式題) (50%)**

*Instruction: You should write the program using one of the following programming languages: C, C++, C#, Fortran, Java, or VB. Code comments are necessary if the statement is not straightforward. The computational efficiency, exception handling, and programming style will be considered in grading.*

4. (20%) For the sum  $S(N) = 1 + 1/2 + 1/3 + \dots + 1/N$ , write a program to calculate the smallest integer,  $N$ , such that  $S(N) > \text{MAX}$ , where  $\text{MAX}$  is a user input.
5. (15%) Write a program that determines the fewest bills and coins required to make change using hundred-dollar bills, fifty-dollar coins, ten-dollar coins, five-dollar coins, and one-dollar coins. For example, if the user inputs 267 (dollars), the output should be
  - 2 hundred-dollar bills
  - 1 fifty-dollar coins
  - 1 ten-dollar coins
  - 1 five-dollar coins
  - 2 one-dollar coins
6. (15%) A *magic square* is an  $n \times n$  matrix such that the sum of every row, column, and diagonal is the same. Write a program that reads in the values for a  $5 \times 5$  matrix and determines whether the matrix is a magic square.

試題隨卷繳回