Programming 3

1. First, write a function

   class Solution { public int solution(int[] A); }

   that, given a zero-indexed array A consisting of N integers, returns the number of distinct values in array A. For example, given array A consisting of six elements such that:

   A[0] = 2   A[1] = 1   A[2] = 1   A[3] = 2   A[4] = 3   A[5] = 1

   the function should return 3, because there are 3 distinct values appearing in array A, namely 1, 2 and 3. Finally, write a simple program that tests your function.

2. A string S consisting of N characters is called properly nested if:

   S is empty;

   S has the form "(U)" where U is a properly nested string;

   S has the form "VW" where V and W are properly nested strings.

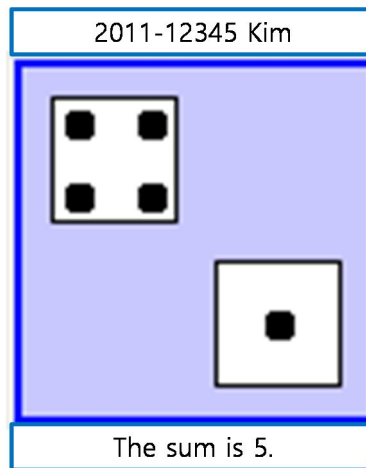   For example, string "(()(())())" is properly nested but string "())" isn't.

   Write a function:

   class Solution { public int solution(String S); }

   that, given a string S consisting of N characters, returns 1 if string S is properly nested and 0 otherwise.

For example, given S = "(()(())())", the function should return 1 and given S = "())", the function should return 0, as explained above. Finally, write a simple program that tests your function.

3. Write a GUI program that shows a pair of dice. When the user clicks on the panel, the dice should be rolled (that is, the dice should be assigned newly computed random values). Each die should be drawn as a square showing from 1 to 6 dots. Your ID/name and the sum of numbers should be presented on top and bottom of frame, respectively. Here is an example of this program.

4. Write a GUI program that is used to order something in the restaurant. Your program should show some items such as Pizza, Oil pasta, Seafood pasta, Fried rice, and Noodle with their prices. If you choose some items and then push a button, the total price should be calculated. Here is an example of this program.

```
┌─────────────────────────────────┐
│        2011-12345 Kim           │
├─────────────────────────────────┤
│  ☑  Pizza            10,000     │
│                                 │
│  ☐  Oil pasta        7,500      │
│                                 │
│  ☐  Seafood pasta   8,000       │
│                                 │
│  ☑  Fried rice       6,000      │
│                                 │
│  ☑  Noodle           4,000      │
│                                 │
├─────────────────────────────────┤
│        Total is 20,000.         │
└─────────────────────────────────┘
```

5. Write your own chat client and server programs by using the codes in the textbook. Your program should satisfy the following requirements.

   A. Your chat client program should provide some GUI.

   B. Your chat client program should use some multithreading.

   C. Compared to the codes in textbook, your program should be improved in several ways. For example, the participants could be identified by name, one person could send a private message to another person, etc. (Note: Explain the points you improved in your document.)

6. Write a program that prints a list of files in a directory specified by the user. Some files in the directory might themselves be directories, and the subdirectories can themselves contain directories. In other words, your program should list all the files in a directory and all its subdirectories, to any level of nesting.