Programming 2

Tutorial 2

Activity 1 (required)

Write a program that simulates rolling a pair of dice. You can simulate rolling one die by choosing one of the integers 1, 2, 3, 4, 5, or 6 at random. The number you pick represents the number on the die after it is rolled. The expression

```
(int)(Math.random()*6) + 1
```

does the computation to select a random integer between 1 and 6. You can assign this value to a variable to represent one of the dice that are being rolled. Do this twice and add the results together to get the total roll. Your program should report the number showing on each die as well as the total roll.
For example:
The first die comes up 3
The second die comes up 5
Your total roll is 8

Activity 2 (required)

Write a program that helps the user count his change. The program should ask how many quarters the user has, then how many dimes, then how many nickels, then how many pennies. Then the program should tell the user how much money he has, expressed in dollars.

Activity 3 (required)

Suppose that a file named “testdata.txt” contains the following information: The first line of the file is the name of a student. Each of the next three lines contains an integer. The integers are the student’s scores on three exams. Write a program that will read the information in the file and display (on standard output) a message that contains the name of the student and the student’s average grade on the three exams. The average is obtained by adding up the individual exam grades and then dividing by the number of exams.

Example content of file testdata.txt
Tran Thanh Nam
5
6
7

Activity 4 (required)

Suppose that M is a two-dimensional array that has R rows and C columns. The transpose of M is defined to be an array T that has C rows and R columns such that T[i][j] = M[j][i] for each i and j. Write a function that takes an array of type int[ ][ ] as a parameter, and returns the transpose of that array. (Assume that the parameter is a typical 2D array in which all the rows have the same length.) Also write a subroutine to print a 2D array of integers in neat rows and columns, and include a main() routine to test your work.

Activity 5 (required)

Write a static function lowestCommon that takes two long arguments and returns the position of the first set bit in common, where position 0 is the lowest set bit. If there is no common bit, the function should return -1.

For example:
`14:  1110`
`25: 11001`
`lowestCommon(14,25)` would be 3.

Activity 6 (optional)

```
1 import java.util.Arrays;
2 /**
3 * This class implements a simple program that
4 * will initialises a string, performs some
5 * basic operations on it and prints the results on the
6 * standard output
7 */
8 public class Strings {
9 public static void main(String[] args) {
10 /* Declare the variables. */
11 String str = "to be or not to be";
12 /* Do some operations on string */
13 char chars[] = str.toCharArray();
14 // convert the array to string
15 String charsAsString = Arrays.toString(chars);
16 int len = str.length();
17 String w1 = str.substring(3,5);
18 String w2 = str.substring(16,18);
19 boolean equal = w1.equals(w2);
20 /* Print out the results */
```

```
21 System.out.println("string: " + str);
22 System.out.println("length: " + len);
23 System.out.println("word 1: " + w1);
24 System.out.println("word 2: " + w2);
25 System.out.println("word 1 is equal to word 2? " +
equal);
26 System.out.println("characters: " + charsAsString);
27 } // end of main()
28
29 } // end of class Strings
```

Answer the following questions about program Strings:
(a). What is the output of str.length()?
(b). What are words w1 and w2 and what is the result of w1.equals(w2)?
(c). What do the two arguments (3,5) and (16,18) of the two invocations of str.substring() mean?
(d). Change the equality test at line 19 to the following statement. Compile and run the program again. What is the result? Why do you think it is?
boolean equal = (w1 == w2);
(e). Given the usage of toCharArray, what is another way of determining the number of characters in the string str? Using comments, briefly write the instructions that you would write in the main method to make this happen.
(f). What is the effect of the operator +?
(g). What would the output at the last line tell you about strings in Java?

Submission

Submit a **zip** file containing all Java programs to this tutorial's submission box in the course website on FIT Portal.