

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

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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 (optional)

There is a shop that has:

N types of products. For each integer i from 1 to N , the i -th type of product has a price of P_i Dong each.

We decide to purchase M type of products from 1 to M , and we will buy Q_i each type.

We will pay the total price of the products purchased.

Calculate the amount we will pay.

All input values are integers and you will read it from file `input.txt`

Content of `input.txt`:

```
N M
P1 Q1
P2 Q2
....
PM QM
....
PN
```

Example content of file `input.txt`

```
7 3
500 2
600 3
700 1
300
1000
1100
100
```

Activity 6 (optional)

```

1 import java.util.Arrays;
2 /**
3  * This class implements a simple program that
4  * will initialise 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.