Beni-Suef University

Faculty of Computers and Artificial Intelligence

First Term 2021/2022

CS 241 - Object Oriented Programming

SHEET #3

Due date: 29-11-2021

1. Write a method with the following header to display three numbers in decreasing order:
   public static void displaySortedNumbers(double num1, double num2, double num3)
   Write a test program that prompts the user to enter three numbers and invokes the method to display them in **decreasing order**.

2. Write a method with the following header to return an integer in reverse order:
   public static int reverse(int number)
   For example, reverse(3456) displays 6543. Write a test program that prompts the user to enter an integer then displays its reversal.

3. Write a method with the following header:
   // Return true if number is a palindrome
   public static boolean isPalindrome(int number)
   Use the reverse method implemented in problem 2 to implement isPalindrome. Write a test program that prompts the user to enter an integer and reports whether the integer is a palindrome.
   Note: A number is a palindrome if its reversal is the same as itself.

4. Write a class that contains the following two methods:
   // Convert from Mile to Kilometer
   public static double mileToKilometer(double mile)
   // Convert from Kilometer to Mile
   public static double kilometerToMile(double kilometer)
   The formula for the conversion is:
   1 mile = 1.6 kilometers
   1 kilometers = 0.6215 mile
   Write a test program that invokes these methods to display the following tables:

Miles	Kilometers		Kilometers	Miles
1	1.609	|	20	12.430
2	3.218	|	25	15.538
...				
9	14.481	|	60	37.290
10	16.090	|	65	40.398

5. Write a method with the following header to check if a number is prime or not:
   public static boolean isPrime(int n)
   Use this method to find the number of prime numbers less than 10000.

6. Write a method to compute the following series:

$$m(i) = \frac{1}{3} + \frac{2}{4} + \cdots + \frac{i}{i+2}$$

   Write a test program that displays the following table:

I	m(i)
1	0.3333
2	0.8333
...	
19	14.7093
20	15.6184

7. Write a method that checks whether a string is a valid password. Suppose the password rules are as follows:
   - ✓ A password must have at least ten characters.
   - ✓ A password consists of only letters and digits.
   - ✓ A password must contain at least three digits.

   Write a program that prompts the user to enter a password and displays Valid Password if the rules are followed or Invalid Password otherwise.

8. Implement the following two methods:
   //Return true if the sum of every two sides is greater than the third side.
   public static boolean isValid(double side1, double side2, double side3)
   //Return the area of the triangle.
   public static double area(double side1, double side2, double side3)
   Write a test program that reads three sides for a triangle and uses the isValid method to test if the input is valid and uses the area method to obtain the area.
   The program displays the area if the input is valid. Otherwise, it displays that the input is invalid. The formula for computing the area of a triangle is given as:

$$s = (\text{side1} + \text{side2} + \text{side3})/2;$$

$$\text{area} = \sqrt{s(s - \text{side1})(s - \text{side2})(s - \text{side3})}$$

9. Write a method that finds the number of occurrences of a specified character in a string using the following header:
   public static int count(String str, char a)
   For example, count("Welcome", 'e') returns 2.
   Write a test program that prompts the user to enter a string followed by a character then displays the number of occurrences of the character in the string.

10. Write a method that converts milliseconds to hours, minutes, and seconds using the following header:
    public static String convertMillis(long millis)
    The method returns a string as "hours:minutes:seconds"
    For example, convertMillis(5500) returns a string 0:0:5,
    convertMillis(100000) returns a string 0:1:40, and
    convertMillis(555550000) returns a string 154:19:10.
    Write a test program that prompts the user to enter a long integer for milliseconds and displays a string in the format of hours:minutes:seconds.

11. Write a program (using arrays) that reads 11 integers, compares each integer with the 11^{th} integer, and displays whether the integers are "greater", "smaller", or "equal" to the 11^{th} integer.

12. Write a method to search if an array contains a specific value and return its index if the element is found otherwise return -1. You can use the following header:

    public static int findElement(int[] array, int element)

13. Write a program to find the common elements between two arrays of integers.

14. Write a program that reads an unspecified number of scores and determines how many scores are above or equal to the average, and how many scores are below the average. Enter a negative number to signify the end of the input. Assume the maximum number of scores is 100.

15. Write a program that generates 200 random integers between 0 and 9 and displays the count for each number. (Hint: Use an array of ten integers, say counts, to store the counts for the number of 0s, 1s, . . . , 9s.)

16. Write a method to test the equality of two arrays using the following header:

Public static boolean equalArrays(double[] arr1, double[] arr2)

17. Write two overloaded methods that return the average of an array with the following headers:
    public static int average(int[] array)
    public static double average(double[] array)
    Write a test program that prompts the user to enter 5 double values and 5 integer values, then displays the average of each group.

18. Write a method that returns a new array by eliminating the duplicate values in the array using the following method header:
    public static int[] eliminateDuplicates(int[] list)
    Write a test program that reads in 10 integers, invokes the method, and displays the distinct numbers separated by exactly one space. Here is a sample run of the program

```
Enter 10 numbers: 1 2 3 2 1 6 3 4 5 2 Enter
The distinct numbers are: 1 2 3 6 4 5
```

19. Write the following method that returns true if the list is already sorted in decreasing order using the following method header:
    public static boolean isSorted(int[] list)
    Write a test program that prompts the user to enter a list and displays whether the list is sorted or not. Here is a sample run.

```
Enter list: 8 10 1 5 16 61 9 11 1 Enter
The list is not sorted
```

```
Enter list: 10 21 11 9 7 5 4 4 3 1 1 Enter
The list is already sorted
```

    Note that the first number in the input indicates the number of the elements in the list. This number is not part of the list.

20. Write a method that returns a random number from a list of numbers passed in the argument. The method header is specified as follows:
    public static int getRandom(int... numbers)

Best Wishes
DR. Noha Yehia