Ollscoil Chathair
Bhaile Átha Cliath
Dublin City University

SEMESTER 2 EXAMINATIONS 2021/2022

MODULE: CA269 - Computer Programming 4 (Object Oriented Prog)

PROGRAMME(S):

CASE	BSc in Computer Applications (Sft.Eng.)
DS	BSc in Data Science
ECSAO	Study Abroad (Engineering & Computing)
ECSA	Study Abroad (Engineering & Computing)

YEAR OF STUDY: 2,O,X

EXAMINER(S):

Dr. Tracey Mehigan (Internal) (Ext:5238)

TIME ALLOWED: 2 Hours

INSTRUCTIONS: **Answer all questions.**

PLEASE DO NOT TURN OVER THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.
The use of programmable or text storing calculators is expressly forbidden.

There are no additional requirements for this paper.

QUESTION 1 ***[TOTAL MARKS: 25]***

Q 1(a) **[5 Marks]**

Write a program which prompts a user to enter their name and produces a nickname formed from the their first three letters of their name. You may assume that there are at least three letters in the name. Example usage:

```
$ java FirstThree
Tell me your name: Jonathan
Your nickname is Jon.
```

You can use the `substring()` method of string to get the nickname. You need to think about the parameters you choose.

Q 1(b) **[5 Marks]**

Write a program which prompts a user to enter their name and and tells the user the last letter in their name. Example usage:

```
$ java LastLetter
What is your name: Jonathan
The last letter in your name is n.
```

You can use the `length()` method along with the substring method. Remember that the index of the last letter is one less than the length.

Q 1(c) **[5 Marks]**

Write a program which reads in a number and if the number is negative, it makes it positive. You can use an `if` statement to determine the stdin is positive or negative. Example usage:

```
$ java Absolute
Enter a number: -5
The absolute value is 5.
```

Q 1(d) **[5 Marks]**

Write a program that reads in a whole number and determines if it is odd or even. Note that the modulus operator gives us the remainder when we perform integer division. You can use an `if` statement to determine if a number is even or odd. Example usage:

```
$ java EvenOdd
Enter a number: 6
6 is even.
```

Q 1(e) **[5 Marks]**

Write a program called `Temp.java` which reads in a temperature in Fahrenheit and converts it to Celsius. However, you should use a method of the Convert class called `fahr2cels()` which takes a double parameter and returns a double.

Use the method as follows:

```
Convert.fahr2cels(32)
```

You could assign this to a variable called temp with the following assignment statement: `temp = Convert.fahr2cels(32);`

Example usage:

```
$ java Temp
Give me a Fahrenheit temperature: 32.0
In Celsius that would be: 0.0
```

[End of Question 1]

QUESTION 2 ***[TOTAL MARKS: 25]***

Q 2(a) **[5 Marks]**

Write a program which will read in a positive integer, `num`, and then print the numbers from `num` up to twenty. Your program should use a for loop and result in the example output.

```
$ java NumToTwenty
Enter a number: 7
7 8 9 10 11 12 13 14 15 16 17 18 19 20
$
```

Note that your output should terminate with a space after the last number and then a newline.

Q 2(b) **[10 Marks]**

Write a program which will keep reading in numbers until it comes to a -1. Your program should then print the number which was just before the -1. result in the example output.

```
$ java NoMinusOne
Enter numbers: 30 15 4 -6 9 -1
The penultimate number was: 9
$

$ java NoMinusOne
Enter numbers: 5 100 -1
The penultimate number was: 100
$
```

Q 2(c) **[10 Marks]**

Using an Array, write a program which reads in a series of positive integers and then prints them out in reverse order. Example usage:

```
$ java Reverse
How many numbers: 4
Enter 4 numbers: 10 20 25 5
The numbers reversed are: 5 25 20 10
```

[End of Question 2]

QUESTION 3 ***[TOTAL MARKS: 25]***

Q 3(a) **[5 Marks]**

write a static `showLetters` method, which instead of taking one character, takes a string of characters representing a sequence of guesses and returns a new string with any guessed letters in their correct position and unguessed letters shown as underscores. For example, the method call:

```
Word.showLetters("computing", "gpo");
would display

_o_p____g
```

That is, any letters guessed are shown in their correct location and an underscore represents letters that are not guessed.

Q 3(b) **[10 Marks]**

Given the following definition of a student class:

```
public class Student
{
   private String name;
   private int mark;

   public Student(String n, int m)
   {
      name = n;
      mark = m;
   }
}
```

Write a method called `numberPassed` which takes as a parameter a List of students and returns a count of the number of students who have passed, i.e., who have a mark of 40% or more.
The method header would look like:

```
public static int numberPassed(List students)
```

Q 3(c) **[10 Marks]**

Create a `BankAccount` class. It should have:

- One field called balance which will represent the current balance of the account. This balance should be represented by a double type.
- Two constructors: a default constructor and a constructor which one
- parameter of type double to initialise the balance.
- A `toString` method which returns a string indicating the balance.
- A setter and a getter to get and set the balance.

[End of Question 3]

QUESTION 4 ***[TOTAL MARKS: 25]***

Q 4(a) **[10 Marks]**

Create an Animal class with a constructor that initialises a name and that returns a greeting which is `Hello, my name is` *`name`* where name will be the animal's name. Your class will be called by the following `Main` class:

```
import java.util.Scanner;

public class Main
{
    public static void main(String [] args)
    {
        Scanner in = new Scanner(System.in);

        String name = in.nextLine();

        Animal ani = new Animal(name);
        System.out.println(ani.greeting());
    }
}
```

Q 4(b) **[15 Marks]**

Write a method which will take an array of Shape Objects and return the average area of the shapes. Your method should be a static method of the Average class and it should be called `averageArea`. It will have one parameter, an array of Shapes and it will return a double, the average area.

The Shape class is shown below:

```
public abstract class Shape
{
   private String name;

   public Shape(String name)
   {
      this.name = name;
   }

   abstract double area();

   public String toString()
   {
      return name + " with area " + area();
   }
```

[End of Question 4]

[END OF EXAM]