CS 2401 Assignment #6

(Prepared by: Dr. Monika Akbar. This document is not for public distribution.)

CS 2401 – Elementary data structures and algorithms

Fall 2022: Lab 6

Due Date: Monday, October 17, 2022 – end of the day.

Objective: The goal of this assignment is to practice **recursion**.

Assignment: You are given a java file called Lab6.java. This program file has some incomplete methods. Your task is to complete the incomplete methods as instructed in the documentation before the method header. Some additional instructions are as follows:

- The **main** method cannot be changed.
- You are not allowed to change any of the method headers.
- You are not allowed to write any additional method.
- **NO loop structure**: none of the methods can contain a syntax for any kind of loop. That is, NO while, do-while, for loops are allowed in this assignment.
- No field variables (attribute variables/global variables) are allowed in this assignment.
- **All the methods you are instructed to complete must be recursive to solve the relevant problem.**
- You can only change the body of the methods marked by `// Write your code here.`

The file Lab6.java is provided with this assignment. You can start by downloading the file from Blackboard. Here is also the content of that file.

Lab6.java

```
class L6_solution{

   /**
   * Do not change the main method.
   */
  public static void main(String[] args){
    System.out.println("\n----------Start-----------\n");
    System.out.println("Testing method: countDigits");
    System.out.println("--------------------------");
    System.out.println("qnRoo0fXVt: "+countDigits("qnRoo0fXVt"));
    System.out.println("UTEP 2022 Go Miners!: "+countDigits("UTEP 2022 Go
Miners!"));
    System.out.println("  :"+countDigits("  "));
    System.out.println("mtQNDhsWU1: "+countDigits("mtQNDhsWU1"));

    System.out.println();
    System.out.println("Testing method: hasCapital");
    System.out.println("------------------------------");
```

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```
    System.out.println("uteP: "+hasCapital("uteP"));
    System.out.println("CS 2401: "+hasCapital("CS 2401"));
    System.out.println("eoenw: "+hasCapital("eoenw"));
    System.out.println("ExjQCPn: "+hasCapital("ExjQCPn"));

    System.out.println();
    System.out.println("Testing method: checkPalindrome");
    System.out.println("-------------------------------");
    System.out.println("alala: "+checkPalindrome("alala"));
    System.out.println("nursesrun: "+checkPalindrome("nursesrun"));
    System.out.println("nurses Run: "+checkPalindrome("nurses Run"));
    System.out.println("level: "+checkPalindrome("level"));

    System.out.println();
    System.out.println("Testing method: reverseString");
    System.out.println("----------------------------");
    System.out.println("xof nworb kciuq: "+reverseString("xof nworb kciuq"));
    System.out.println("cotton candy: "+reverseString("cotton candy"));
    System.out.println("ETEP reniM: "+reverseString("ETEP reniM"));

    System.out.println();
    System.out.println("Testing method: updateString");
    System.out.println("-------------------------------");
    System.out.println(updateString(
          "Computer science is no more about computers than astronomy is about
telescopes",
          "aeiou"));
    System.out.println(updateString(
          "He%ll*o, W(o)rld.", "*,%()"));
    System.out.println(updateString(
          "1I2 3t4h5i6n7k8, 9t0h@e#r%e^f*ore 1I1 2a3m5.",
          "1234567890@%#^*+"));
    System.out.println("\n-----------End-----------\n");
  }

  /**
   * Write a recursive method to return number of digits in a string.
   * @param str
   * @return
   */
  static int countDigits(String str){
    // Write your code here.

    int count =0;

    return count;
  }

  /**
   * Write a recursive method to find if a string contains
   * any capital letter (any letter between A-Z).
   * @param str
   * @return
   */
```

To Chegg: Please do not provide solution if this document is uploaded. Please remove this document from Chegg, if uploaded.

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```
    static boolean hasCapital(String str){
      // Write your code here.

      return false;
  }

  /**
   * Write a recursive method to check if a given string
   * is a Palindrome.
   * @param str
   * @return
   */
  static boolean checkPalindrome(String str){
     // Write your code here.

      return false;
  }

  /**
   * Write a recursive method to reverse the order
   * of a given string.
   * @param str
   * @return
   */

  static String reverseString(String str){
       // Write your code here.

      return str;
  }

  /**
   * Write a recursive method that will return
   * a string containing only the characters of a given
   * string but not in another string.
   *
   * You are not allowed to use the replace or
   * replaceAll method of the String class.
   *
   * The returned string must contain the characters
   * of the given string in the same sequence they
   * appear in the given String.
   */

  static String updateString(String given,
          String unexpectedCh){

    // Write your code here.

    return given;
  }
}
```

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For the given java file, the terminal output is shown below (marked in blue).

Deliverables: You must submit only one file (`Lab_6.java`) **after you write your codes in the designated areas.** You must not submit any other file. Your TA will instruct you with further details, if any.

```
----------Start----------

Testing method: countDigits
---------------------------
qnRoo0fXVt: 1
UTEP 2022 Go Miners!: 4
  :0
mtQNDhsWU1: 1

Testing method: hasCapital
------------------------------
uteP: true
CS 2401: true
eoenw: false
ExjQCPn: true

Testing method: checkPalindrome
-------------------------------
alala: true
nursesrun: true
nurses Run: false
level: true

Testing method: reverseString
-----------------------------
xof nworb kciuq: quick brown fox
cotton candy: ydnac nottoc
ETEP reniM: Miner PETE

Testing method: updateString
-------------------------------

Cmptr scnc s n mr bt cmptrs thn strnmy s bt tlscps
Hello World.
I think, therefore I am.

----------End----------
```

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Grading Criteria:

- [5 points] The Program **compiles and runs**.
- [10 points] The program is **indented** and **documented** properly.
- [10 points] The program uses the correct **variable types** and **names**.
- [75 points] The program has all the correct methods with correct logic and generates correct output.

- Late submission: [**-10**] points for every 24 hours after the deadline.

If you need any clarification, please ask your TA for further details.