Assignment 1

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Subject: Java Programming

Code: CSPC-23

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1. Count the number of letters in a string

Write a method that counts the number of letters in a string using the following header:

`public static int countLetters(String s)`

Write a test program that prompts the user to enter a string and displays the number of letters in the string.

```
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter the string --> ");
        String string = scanner.nextLine();

        System.out.println("\nNumber of letters in the string --> " +
countLetters(string));
    }

    public static int countLetters(String s) {
        int count = 0;
        for (int i=0; i<s.length(); i++)
            if (Character.isLetter(s.charAt(i)))
                count++;
        return count;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "1. Count.java"
Enter the string --> Hello123

Number of letters in the string --> 5
[getpsyched@Manjaro Assignment 1]$ java "1. Count.java"
Enter the string --> My name is 123

Number of letters in the string --> 8
```

2. Check if a string is a valid password

Some websites impose certain rules for passwords. 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 eight characters.
- A password consists of only letters and digits.
- A password must contain at least two 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.

```java
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter the password --> ");
        String string = scanner.nextLine();

        if (validatePassword(string))
            System.out.println("Valid Password");
        else
            System.out.println("Invalid Password");
    }

    public static boolean validatePassword(String s) {
        int len = s.length();
        if (len < 8)
            return false;

        int digits = 0;
        for (int i=0; i<len; i++) {
            if (!Character.isLetterOrDigit(s.charAt(i)))
                return false;
            if (Character.isDigit(s.charAt(i)))
                digits++;
        }

        if (digits < 2)
            return false;

        return true;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "2. Password Validation.java"
Enter the password --> abc
Invalid Password
[getpsyched@Manjaro Assignment 1]$ java "2. Password Validation.java"
Enter the password --> !@#$%
Invalid Password
[getpsyched@Manjaro Assignment 1]$ java "2. Password Validation.java"
Enter the password --> pass1
Invalid Password
[getpsyched@Manjaro Assignment 1]$ java "2. Password Validation.java"
Enter the password --> validPassword123
Valid Password
```

3. Find the largest common prefix between two strings

Write a program that prompts the user to enter two strings and displays the largest common prefix of the two strings. Here are some sample runs:

Enter the first string: Welcome to C++
Enter the second string: Welcome to programming
The common prefix is Welcome to
Enter the first string: Atlanta
Enter the second string: Macon
Atlanta and Macon have no common prefix

```java
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter first string --> ");
        String string1 = scanner.nextLine();

        System.out.print("Enter second string --> ");
        String string2 = scanner.nextLine();

        String prefix = checkPrefix(string1, string2);

        if (!prefix.isEmpty())
            System.out.println("\nThe common prefix is " + prefix);
        else
            System.out.println(String.format("\n%s and %s have no common prefix", string1, string2));
    }

    public static String checkPrefix(String s1, String s2) {
        int len1 = s1.length();
        int len2 = s2.length();

        String prefix = "";

        for (int i=0; i < len1 && i < len2; i++)
            if (s1.charAt(i) == s2.charAt(i))
                prefix += s1.charAt(i);
            else
                return prefix;

        return prefix;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "3. Common Prefix.java"
Enter first string --> Welcome to C++
Enter second string --> Welcome to programming

The common prefix is Welcome to
[getpsyched@Manjaro Assignment 1]$ java "3. Common Prefix.java"
Enter first string --> Atlanta
Enter second string --> Macon

Atlanta and Macon have no common prefix
```

4. Check if the inputted SSN is valid

Write a program that prompts the user to enter a Social Security Number in the format DDD-DD-DDDD, where D is a digit. Your program should check whether the input is valid. Here are some sample runs:

Enter a SSN: 232-23-5435
232-23-5435 is a valid social security number
Enter a SSN: 23-23-5435
23-23-5435 is an invalid social security number

```
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter a SSN --> ");
        String ssn = scanner.nextLine();

        if (validateNumber(ssn))
            System.out.println(ssn + " is a valid SSN");
        else
            System.out.println(ssn + " is an invalid SSN");
    }

    public static boolean validateNumber(String s) {
        if (s.length() < 11)
            return false;

        try {
            Integer.parseInt(s.substring(0, 3));
            Integer.parseInt(s.substring(4, 6));
            Integer.parseInt(s.substring(7, 11));
        } catch (NumberFormatException e) {
            return false;
        }

        if (s.charAt(3) != '-' || s.charAt(6) != '-')
            return false;

        return true;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "4. Number Validation.java"
Enter a SSN --> 232-23-5435
232-23-5435 is a valid SSN
[getpsyched@Manjaro Assignment 1]$ java "4. Number Validation.java"
Enter a SSN --> 23-23-5435
23-23-5435 is an invalid SSN
```

5. Check if the 2nd string is a substring of the 1st string

Write a program that prompts the user to enter two strings and reports whether the second string is a substring of the first string. Here are some sample runs:

```
Enter string s1: ABCD
Enter string s2: BC
BC is a substring of ABCD

Enter string s1: ABCD
Enter string s2: BDC
BDC is not a substring of ABCD
```

```java
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter first string --> ");
        String string1 = scanner.nextLine();

        System.out.print("Enter second string --> ");
        String string2 = scanner.nextLine();

        if (checkSubstring(string1, string2))
            System.out.println(String.format("\n%s is a substring of %s", string2, string1));
        else
            System.out.println(String.format("\n%s is not a substring of %s", string2, string1));
    }

    public static boolean checkSubstring(String s1, String s2) {
        int len1 = s1.length();
        int len2 = s2.length();

        if (len2 > len1)
            return false;

        int i, j;
        for (i=0; i < len1-len2; i++)
            for (j=0; j < len2; j++)
                if (s1.charAt(i+j) != s2.charAt(j))
                    break;
                else if (j == len2 - 1)
                    return true;

        return false;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "5. Substring.java"
Enter first string --> ABCD
Enter second string --> BC

BC is a substring of ABCD
[getpsyched@Manjaro Assignment 1]$ java "5. Substring.java"
Enter first string --> ABCD
Enter second string --> BDC

BDC is not a substring of ABCD
```

6. Check if an array has four consecutive equal numbers

Write the following method that tests whether the array has four consecutive numbers with the same value.

`public static boolean isConsecutiveFour(int[] values)`

Write a test program that prompts the user to enter a series of integers and displays if the series contains four consecutive numbers with the same value. Your program should first prompt the user to enter the input size—i.e., the number of values in the series. Here are some sample runs:

```
Enter the number of values: 8
Enter the values: 3 4 5 5 5 5 4 5
The list has consecutive fours
```

```
Enter the number of values: 9
Enter the values: 3 4 5 5 6 5 5 4 5
The list has no consecutive fours
```

```java
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter the number of values --> ");
        int n = scanner.nextInt();

        System.out.print("Enter the values --> ");
        int i;
        int values[] = new int[n];
        for (i=0; i<n; i++)
            values[i] = scanner.nextInt();

        if (isConsecutiveFour(values))
            System.out.println("\nThe list has consecutive fours");
        else
            System.out.println("\nThe list has no consecutive fours");
    }

    public static boolean isConsecutiveFour(int[] values) {
        int count = 0;
        for (int num=1; num < values.length; num++) {
            if (values[num] == values[num-1])
                count += 1;
            else
                count = 1;
            if (count == 4)
                return true;
        }
        return false;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "6. Consecutive Four.java"
Enter the number of values --> 8
Enter the values --> 3 4 5 5 5 5 4 5

The list has consecutive fours
[getpsyched@Manjaro Assignment 1]$ java "6. Consecutive Four.java"
Enter the number of values --> 9
Enter the values --> 3 4 5 5 6 5 5 4 5

The list has no consecutive fours
```

7. Remove duplicates from an array

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 ten integers, invokes the method, and displays the result. Here is the sample run of the program:

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

```java
import java.util.Scanner;

public class foobar {

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

        System.out.print("Enter ten numbers --> ");
        int i, list[] = new int[10];
        for (i=0; i<10; i++)
            list[i] = scanner.nextInt();

        int result[] = eliminateDuplicates(list);

        System.out.print("The distinct numbers are --> ");
        for (i=0; i < result.length; i++)
            System.out.print(result[i] + " ");
    }

    public static int[] eliminateDuplicates(int[] list) {
        int count = 0;
        int temp[] = new int[10];

        for (int i = 0; i < list.length; i++) {
            boolean exists = false;
            for (int j = 0; j < temp.length; j++)
                if (temp[j] == list[i])
                    exists = true;

            if (!exists)
                temp[count++] = list[i];
        }

        int result[] = new int[count];
        System.arraycopy(temp, 0, result, 0, count);
        return result;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "7. Duplicates.java"
Enter ten numbers --> 1 1 2 3 4 4 5 8 9 9
The distinct numbers are --> 1 2 3 4 5 8 9
[getpsyched@Manjaro Assignment 1]$ java "7. Duplicates.java"
Enter ten numbers --> 1 2 3 2 1 6 3 4 5 2
The distinct numbers are --> 1 2 3 6 4 5
```

8. Check if two arrays are identical

The arrays **`list1`** and **`list2`** are identical if they have the same contents. Write a method that returns true if **`list1`** and **`list2`** are identical, using the following header:

`public static boolean equals(int[] list1, int[] list2)`

Write a test program that prompts the user to enter two lists of integers and displays whether the two are identical. Here are the sample runs. 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.

```
Enter list1: 5 2 5 6 6 1
Enter list2: 5 5 2 6 1 6
Two lists are identical
```

```
Enter list1: 5 5 5 6 6 1
Enter list2: 5 2 5 6 1 6
Two lists are not identical
```

```java
import java.util.Scanner;

public class foobar {

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


        System.out.print("Enter first list --> ");
        int list1[] = new int[scanner.nextInt()];
        for (int i = 0; i < list1.length; i++)
            list1[i] = scanner.nextInt();

        System.out.print("Enter second list --> ");
        int list2[] = new int[scanner.nextInt()];
        for (int i = 0; i < list2.length; i++)
            list2[i] = scanner.nextInt();

        if (equals(list1, list2))
            System.out.println("\nTwo lists are identical");
        else
            System.out.println("\nTwo lists are not identical");
    }

    public static boolean equals(int[] list1, int[] list2) {
        if (list1.length != list2.length)
            return false;

        for (int i = 0; i < list1.length; i++) {
            boolean exists = false;
            for (int j = 0; j < list2.length; j++)
                if (list1[i] == list2[j]) {
                    exists = true;
                    list2[j] = '\0';
                    break;
                }
```

```
            if (!exists)
                return false;
        }

        return true;
    }
}
```

```
[getpsyched@Manjaro Assignment 1]$ java "8. Identical.java"
Enter first list --> 5 2 5 6 6 1
Enter second list --> 5 5 2 6 1 6

Two lists are identical
[getpsyched@Manjaro Assignment 1]$ java "8. Identical.java"
Enter first list --> 5 5 5 6 6 1
Enter second list --> 5 2 5 6 1 6

Two lists are not identical
```