LAB ASSIGNMENT 3

Vansh Sukhija
12112021

1. Write a Java program that reads an array of integers and then moves every zero to
the right side i.e. towards the end.

Code-

```
import java.util.*;
public class assignment2{
   public static void main(String args[]){
      Scanner sc=new Scanner(System.in);
      System.out.println(&amp;quot;Enter length of array: &amp;quot;);
      int n=sc.nextInt();
      int arr[]=new int[n];
      for(int i=0;i&amp;lt;n;i++){
         arr[i]=sc.nextInt();
      }
      for(int i=n-1,j=n-1;i&amp;gt;=0;i--){
         if(arr[i]==0){
            int a=arr[i];
            arr[i]=arr[j];
            arr[j--]=a;
         }
      }
      for(int i=0;i&amp;lt;n;i++){
         System.out.print(arr[i]+&amp;quot; &amp;quot;);
      }
      sc.close();
   }
}
```

OUTPUT

```
Enter length of array:
6
0 90 0 -23 0 100
-23 90 100 0 0 0
```

2. Write a Java program to find the k (for given k) largest elements in a given array. Elements in the array can be in any order. Don't forget to check boundary condition for
k.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.print(&amp;quot;Enter length of array: &amp;quot;);
        int n = sc.nextInt();
        System.out.print(&amp;quot;Enter k: &amp;quot;);
        int k = sc.nextInt(), c = 1;
```

```
        int arr[] = new int[n];
        for (int i = 0; i &lt; n; i++) {
            arr[i] = sc.nextInt();
        }
        Arrays.sort(arr);
        for (int i = n - 1; i &gt;= 0; i--) {
            if (i&lt;n-1&amp;&amp;arr[i] != arr[i + 1])
                c++;

            if (c == k) {
                System.out.println(k + &quot;th largest element is &quot; +
arr[i]);
                break;
            }
        }
        if (c &lt; k) {
            System.out.println(&quot;Not Present&quot;);
        }
        sc.close();
    }
}
```

OUTPUT

```
Enter length of array: 6
Enter k: 2
2 3 3 3 3 3
2th largest element is 2
```

3.Write a Java program to check if a given positive number is a palindrome or not.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&quot;Enter a number: &quot;);
        int n = sc.nextInt();
        int reverse = 0, original = n;
        while (n &gt; 0) {
            reverse = reverse * 10 + n % 10;
            n /= 10;
        }
        if (reverse == original) {
            System.out.println(&quot;YES, It is Palindrome&quot;);
        } else {
            System.out.println(&quot;NO, It is Palindrome&quot;);
        }
        sc.close();
    }
}
```

OUTPUT

```
Enter a number:
56865
YES, It is Palindrome
```

4. Write a Java program to check if an array of integers contains three increasing adjacent numbers.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&amp;quot;Enter length of array: &amp;quot;);
        int n = sc.nextInt(), count = 0;
        int arr[] = new int[n];
        for (int i = 0; i &amp;lt; n; i++) {
            arr[i] = sc.nextInt();
        }
        for (int i = n - 2; i &amp;gt; 0; i--) {
            if (arr[i] &amp;lt; arr[i + 1] &amp;amp;&amp;amp; arr[i - 1] &amp;lt; arr[i]) {
                count++;
                System.out.println(arr[i - 1] + &amp;quot; &amp;quot; + arr[i] + &amp;quot;
&amp;quot; + arr[i + 1]);
            }
        }
        System.out.println(&amp;quot;Total 3 adjacent increasing triplet are &amp;quot; +
count);
        sc.close();
    }
}
```

OUTPUT

```
Enter length of array:
7
1 3 5 2 8 10 2
2 8 10
1 3 5
Total 3 adjacent increasing triplet are 2
```

5. Write a Java program to find the number of integers within the range of two specified numbers x & y and that are divisible by another number, p.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&amp;quot;Enter Range(space between two integer) : &amp;quot;);
        int x = sc.nextInt();int y = sc.nextInt();
        System.out.println(&amp;quot;Enter p: &amp;quot;);
        int p = sc.nextInt();
        int count = 0;
        for (int i = x; i &amp;lt;= y; i++) {
            if (i % p == 0){count++;}
        }
        System.out.println(&amp;quot;Total no of values divisible by &amp;quot; + p +
```

```
&quot; in the given
range is &quot; + count);
        sc.close();
    }
}
```

OUTPUT

```
Enter Range(space between two integer) : 34 90
Enter p: 2
Total no of values divisible by 2 in the given range is 29
```

6. Write a Java program to accept two strings and test if the second string contains the first one.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&quot;Enter two string:&quot;);
        String one = sc.nextLine();
        String two = sc.nextLine();
        if (two.contains(one) == true) {
            System.out.println(&quot;Yes, 2nd string contains 1st string.&quot;);
        } else {
            System.out.println(&quot;No, 2nd string doesn&#39;t contains 1st
string.&quot;);
        }
        sc.close();
    }
}
```

OUTPUT

```
Enter two string:
yanki
tyanki
Yes, 2nd string contains 1st string.
```

7. Write a Java program to read two strings from keyboard and compare them lexicographically.

Code-

```
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&quot;Enter two string:&quot;);
        int i;
        String one = sc.nextLine();
        String two = sc.nextLine();

        for (i = 0; i &lt; (one.length() &lt; two.length() ? one.length() :
two.length()); i++) {
            if (one.charAt(i) != two.charAt(i)) {
                break;
            }
        }
        if (i &lt; (one.length() &lt; two.length() ? one.length() : two.length()))
{
            System.out.println(&quot;First point of difference occur at index
```

```
&quot; + (i +
1) + &quot;.&quot;);
            if (one.charAt(i) &gt; two.charAt(i)) {
                System.out.println(&quot;1st string is greater than 2nd.&quot;);
            } else {
                System.out.println(&quot;2nd string is greater than 1st.&quot;);
            }
        } else {
            if (one.length() &gt; two.length()) {

                System.out.println(&quot;First point of difference occur at index
&quot; +
(i + 1) + &quot;.&quot;);
                System.out.println(&quot;1st string is greater than 2nd.&quot;);
            } else if (one.length() &lt; two.length()) {
                System.out.println(&quot;First point of difference occur at index
&quot; +
(i + 1) + &quot;.&quot;);
                System.out.println(&quot;2nd string is greater than 1st.&quot;);
            } else
                System.out.println(&quot;Both string are equal.&quot;);
        }
        sc.close();
    }
}
```

OUTPUT

```
Enter two string:
hello
helko
First point of difference occur at index 4.
1st string is greater than 2nd.
```

8. Write a Java program to test if a given string contains the specified sequence of char values.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&quot;Enter a string and seq_of_char:&quot;);
        String str = sc.nextLine();
        String seq = sc.nextLine();
        int j = 0;
        for (int i = 0; i &lt; str.length(); i++) {
            if (str.charAt(i) == seq.charAt(j)) {
                j++;
            }
            if (j == seq.length()) {
                System.out.println(&quot;Yes the string contains the sequence of
char.&quot;);
                return;
            }
        }
        System.out.println(&quot;No, the string contains the sequence of
char.&quot;);
        sc.close();
```

```
    }
}
```

OUTPUT

```
Enter a string and seq_of_char:
chaudhary
cadary
Yes the string contains the sequence of char.
```

9. Write a Java program to trim any leading or trailing whitespace from a given string.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&amp;quot;Enter a string:&amp;quot;);
        String str = sc.nextLine();
        // trim function returns a string after trimming , do not chnage the
string by itself
        str = str + &amp;quot; &amp;quot;;
        System.out.println(&amp;quot;Before trimming &amp;#39;&amp;quot; + str +
&amp;quot;&amp;#39;&amp;quot;);
        System.out.println(&amp;quot;After trimming &amp;#39;&amp;quot; + str.trim() +
&amp;quot;&amp;#39;&amp;quot;);
        str = str.trim();
        str = &amp;quot; &amp;quot; + str;
        System.out.println(&amp;quot;Before trimming &amp;#39;&amp;quot; + str +
&amp;quot;&amp;#39;&amp;quot;);
        System.out.println(&amp;quot;After trimming &amp;#39;&amp;quot; + str.trim() +
&amp;quot;&amp;#39;&amp;quot;);
        str = str.trim();
        str = &amp;quot; &amp;quot; + str + &amp;quot; &amp;quot;;
        System.out.println(&amp;quot;Before trimming &amp;#39;&amp;quot; + str +
&amp;quot;&amp;#39;&amp;quot;);
        System.out.println(&amp;quot;After trimming &amp;#39;&amp;quot; + str.trim() +
&amp;quot;&amp;#39;&amp;quot;);
        str = str.trim();
        sc.close();
    }
}
```

OUTPUT

```
Enter a string:
mam
Before trimming 'mam '
After trimming 'mam'
Before trimming ' mam'
After trimming 'mam'
Before trimming ' mam '
After trimming 'mam'
```

10. Write a program that reads an arbitrary number of even integers that are in the range 2 to 100 inclusive and counts how many occurrences of each are entered.

Indicate the end of the input by entering -1. After entire input has been processed, print all of the values that were entered by the user along with the number of occurrences.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println(&amp;quot;Enter values in range 2 to 100 : &amp;quot;);
        int freq[] = new int[101];
        do {
            int a = sc.nextInt();
            if (a == -1) {
                break;

            }
            freq[a]++;
        } while (true);
        for (int i = 2; i &amp;lt; 101; i++) {
            if (freq[i] != 0) {
                System.out.println(i + &amp;quot; has occured &amp;quot; + freq[i] +
&amp;quot; times.&amp;quot;);
            }
        }
        sc.close();
    }
}
```

OUTPUT

```
Enter values in range 2 to 100 :
89
23 7 5 27 89 100 23 34 23 89 27
-1
5 has occured 1 times.
7 has occured 1 times.
23 has occured 3 times.
27 has occured 2 times.
34 has occured 1 times.
89 has occured 3 times.
100 has occured 1 times.
```

11. Use a one-dimensional array to solve the following problem:
Write an application that inputs five numbers, each between 10 and 100, inclusive. As each number is read, display it only if it's not a duplicate of a number already read. Provide for the "worst case," in which all five numbers are different. Use the smallest possible array to solve this problem. Display the complete set of unique values input after the user enters each new value.

Code-

```
import java.util.*;
public class assignment2 {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        int []arr= new int[5];
        System.out.println(&amp;quot;Enter 5 values: &amp;quot;);
        for(int i=0;i&amp;lt;5;i++){
```

```
            arr[i]=sc.nextInt();
            System.out.print(&amp;quot;SET -&amp;gt; &amp;quot;);
            for(int j=0;j&amp;lt;=i;j++){
                int c=0;
                for(int k=j;k&amp;lt;=i;k++){
                    if(arr[k]==arr[j]){c++;}
                }
                if(c==1){System.out.print(arr[j]+&amp;quot; &amp;quot;);}
            }
            System.out.println();
        }
        sc.close();}
}
```

OUTPUT

```
Enter 5 values:
3
SET -> 3
89
SET -> 3 89
3
SET -> 89 3
45
SET -> 89 3 45
89
SET -> 3 45 89
```

12. Write a class called NumberOfSixes that represents the total number of sixes hit by an IPL team in a given match. The NumberOfSixes class should contain a single integer as instance data, representing the number of sixes hit. Write a constructor to initialize the number of sixes to zero. Write a method called setSix that increments the value by one whenever a six is hit, and another method called getSix that returns the total number of sixes hit so far. Finally, create a driver class called SixTracker that creates a few NumberOfSixes objects and tests their methods.

Code-

```
public class assignment2 {
   public static void main(String[] args) {
      NumberOfSixes team1,team2,team3,team4,team5;
      team1=new NumberOfSixes();team2=new NumberOfSixes();
      team3=new NumberOfSixes();team4=new NumberOfSixes();
      team5=new NumberOfSixes();
      System.out.println(&amp;quot;Team 1 : &amp;quot;+team1.getSix()+&amp;quot; sixes&amp;quot;);
      team1.setSix();
      team1.setSix();
      team1.setSix();
      System.out.println(&amp;quot;Team 1 : &amp;quot;+team1.getSix()+&amp;quot; sixes&amp;quot;);
      System.out.println(&amp;quot;Team 2 : &amp;quot;+team2.getSix()+&amp;quot; sixes&amp;quot;);
      team2.setSix();
      team2.setSix();
      System.out.println(&amp;quot;Team 2 : &amp;quot;+team2.getSix()+&amp;quot; sixes&amp;quot;);

      team3.setSix();
      System.out.println(&amp;quot;Team 3 : &amp;quot;+team3.getSix()+&amp;quot; sixes&amp;quot;);
      team4.setSix();
      team4.setSix();
      System.out.println(&amp;quot;Team 4 : &amp;quot;+team4.getSix()+&amp;quot; sixes&amp;quot;);
      team5.setSix();
```

```
        System.out.println(&amp;quot;Team 5 : &amp;quot;+team5.getSix()+&amp;quot; sixes&amp;quot;);
    }
}
class NumberOfSixes {
    int sixcount;
    NumberOfSixes(){
        sixcount=0;

    }
    void setSix(){
        sixcount++;
    }
    int getSix(){
        return sixcount;
    }
}
```

OUTPUT

```
Team 1 : 0 sixes
Team 1 : 3 sixes
Team 2 : 0 sixes
Team 2 : 2 sixes
Team 3 : 1 sixes
Team 4 : 2 sixes
Team 5 : 1 sixes
```

14. Create class SavingsAccount. Use a static variable annualInterestRate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savingsBalance indicating the amount the saver currently has on deposit. Provide method calculateMonthlyInterest to calculate the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12—this interest should be added to savings-Balance. Provide a static method modifyInterestRate that sets the annualInterestRate to a new value. Write a program to test class SavingsAccount. Instantiate two savingsAccount objects, saver1 and saver2, with balances of `2000.00 and `3000.00, respectively. Set annualInterestRate to 4%, then calculate the monthly interest for each of 12 months and print the new balances for both savers. Next, set the annualInterestRate to 5%, calculate the next month's interest and print the new balances for both savers.

Code-

```
import java.util.*;
public class assignment2{
    public static void main(String[] args) {

        SavingsAccount saver1=new SavingsAccount(2000.00);
        SavingsAccount saver2=new SavingsAccount(3000.00);
        SavingsAccount.modifyInterestRate(4);
        for(int i=0;i&amp;lt;12;i++){
            saver1.calculateMonthlyInterest();
        }
```

```
        for(int i=0;i&lt;12;i++){
            saver2.calculateMonthlyInterest();
        }
        System.out.print(&quot;Balance of saver1 is &quot;); saver1.display();
        System.out.print(&quot;Balance of saver2 is &quot;); saver2.display();
        SavingsAccount.modifyInterestRate(5);
        saver1.calculateMonthlyInterest();
        saver2.calculateMonthlyInterest();
        System.out.print(&quot;Balance at the end of saver1 is &quot;);
saver1.display();
        System.out.print(&quot;Balance at the end of saver2 is &quot;);
saver2.display();
    }
}

class SavingsAccount{
    static double annualInterestRate;
    double savingsBalance;
    SavingsAccount(double bal){
        savingsBalance=bal;
    }
    double calculateMonthlyInterest(){
        savingsBalance+=savingsBalance*annualInterestRate/12.0;
        return savingsBalance*annualInterestRate/12.0;
    }
    static void modifyInterestRate(double newrate){
        annualInterestRate=newrate;
    }
    void display(){
        System.out.println(savingsBalance);
    }
}
```

OUTPUT

```
Balance of saver1 is 2081.4830858395785
Balance of saver2 is 3122.2246287593684
Balance at the end of saver1 is 2090.155932030577
Balance at the end of saver2 is 3135.2338980458658
```

15. Design a class named StopWatch. The class contains:

■ Private data fields startTime and endTime with getter methods.

■ A no-arg constructor that initializes startTime with the current time.

■ A method named start() that resets the startTime to the current time.

■ A method named stop() that sets the endTime to the current time.

■ A method named getElapsedTime() that returns the elapsed time for the stopwatch in milliseconds.

Code-

```
import java.util.*;
import java.time.temporal.ChronoField;
import java.time.*;
public class assignment2 {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        StopWatch timer=new StopWatch();
        System.out.println(&quot;Current time is &quot;+timer.getstart());
        System.out.println(&quot;Press any character and enter to start
```

```
Stopwatch.&amp;quot;);
        sc.next().charAt(0);
        timer.start();
        System.out.println(&amp;quot;\nTimer starts at &amp;quot;+timer.getstart());

        System.out.println(&amp;quot;Stopwatch is running.\nPress any charcater to Stop
Stopwatch.&amp;quot;);
        sc.next().charAt(0);
        timer.stop();
        System.out.println(&amp;quot;\nStopwatch stops at &amp;quot;+timer.getend());
        System.out.println(&amp;quot;Time elapsed (in milliseconds)
&amp;quot;+timer.getElapsedTime());
        sc.close();
    }

}
class StopWatch{
    LocalTime startTime;
    LocalTime endTime;
    LocalTime getstart(){
        return (startTime);
    }
    LocalTime getend(){
        return (endTime);
    }
    StopWatch(){
        startTime=LocalTime.now();
    }
    void start(){
        startTime=LocalTime.now();
    }
    void stop(){
        endTime=LocalTime.now();
    }
    double getElapsedTime(){
        double hrms=(endTime.getHour()-startTime.getHour())*60*60*1000.0;
        double mms=(endTime.getMinute()-startTime.getMinute())*60*1000.0;
        double sms=(endTime.getSecond()-startTime.getSecond())*1000.0;
        double ms=(endTime.get(ChronoField.MILLI_OF_SECOND)-
startTime.get(ChronoField.MILLI_OF_SECOND));
        return  hrms+mms+sms+ms;
    }
}
```

OUTPUT

```
Current time is 12:05:54.026372
Press any character and enter to start Stopwatch.
*

Timer starts at 12:06:04.601598400
Stopwatch is running.
Press any charcater to Stop Stopwatch.
*

Stopwatch stops at 12:06:11.377236700
Time elapsed (in milliseconds) 6776.0
```

```
Current time is 12:07:56.986557400
Press any character and enter to start Stopwatch.
*

Timer starts at 12:07:57.394990400
Stopwatch is running.
Press any charcater to Stop Stopwatch.
*

Stopwatch stops at 12:08:08.807795600
Time elapsed (in milliseconds) 11413.0
```

13. Design and implement a set of classes that define various types of reading material: books, novels, magazines, technical journals, textbooks, and so on. Include data values that describe various attributes of the material, such as the number of pages and the names of the primary characters. Include methods that are named appropriately for each class and that print an appropriate message. Create a main driver class to instantiate and exercise several of the classes.

Code-

```
import java.util.*;
public class assignment2 {

    public static void main(String[] args) {
        Scanner inp=new Scanner(System.in);
        novels first=new novels();
        String a;int b;double c;
        System.out.print(&quot;Enter novel name: &quot;);
        a=inp.next();
        first.title=a;
        System.out.print(&quot;who wrote this book? : &quot;);
        a=inp.next();
        first.author=a;
        System.out.print(&quot;who played the primary role? : &quot;);
        a=inp.next();
        first.maincharacter=a;
        System.out.print(&quot;rating (out of 10)?: &quot;);
        c=inp.nextDouble();
        first.maincharacter=a;
        System.out.println(&quot;-------------------------&quot;);
        magazine second=new magazine();
        System.out.print(&quot;Who&#39;s on the front page of the magazine:&quot;);
        a=inp.next();
        second.front=a;
        System.out.print(&quot;Editor/Publisher Name : &quot;);
        a=inp.next();
        second.editor=a;
        System.out.print(&quot;Month and Year : &quot;);
        a=inp.next();
        second.month=a;
        b=inp.nextInt();
        second.year=b;
        inp.close();
        first.details();
        System.out.println(&quot;----------------------&quot;);
        second.details();
    }
}
class books {
    String title;
    String author;
    String ISBN;
    double price;
    void details(){
        System.out.println(&quot;Title : &quot;+title+&quot;\nAuthor :
&quot;+author+&quot;\nISBN : &quot;+ISBN+&quot;\nCost :
&quot;+price);
```

```
    }
}
class novels {
    String title;
    String author;
    String maincharacter;

    double rating;
    void details(){
        System.out.println(&amp;quot;Title : &amp;quot;+title+&amp;quot;\nAuthor :
&amp;quot;+author+&amp;quot;\nKeyRole :
&amp;quot;+maincharacter+&amp;quot;\nRated : &amp;quot;+rating +&amp;quot; out of 10.0&amp;quot;);
    }
}
class magazine {
    String front;
    String editor;
    int year;
    String month;
    void details(){
        System.out.println(&amp;quot;On the Front Page :
&amp;quot;+front+&amp;quot;\nEdited/Published By :
&amp;quot;+editor+&amp;quot;\nPublished in &amp;quot;+month+&amp;quot; &amp;quot;+year);
    }
}
class textbook {
    String title;
    String author;
    String publisher;
    int edition;
    int pages;
    void details(){
        System.out.println(&amp;quot;Title : &amp;quot;+title+&amp;quot;\nAuthor :
&amp;quot;+author+&amp;quot;\nPublished By :
&amp;quot;+publisher+&amp;quot;\nEdition : &amp;quot;+edition+&amp;quot;\nTotal Pages : &amp;quot;+pages);
    }
}
```

OUTPUT

```
Enter novel name: Three_men_in_a_boat
who wrote this book? : Jerome.k.Jerome
who played the primary role? : Jerome
rating (out of 10)?: 8.3
-------------------------
Who's on the front page of the magazine:Narendra_Modi
Editor/Publisher Name : OPEN
Month and Year : July 2020
Title : Three_men_in_a_boat
Author : Jerome.k.Jerome
KeyRole : Jerome
Rated : 0.0 out of 10.0
----------------------
On the Front Page : Narendra_Modi
Edited/Published By : OPEN
Published in July 2020
```