Java

Q1. Write a program to enter few integer elements in an array and find the largest and smallest element present in that array.

Solution:

```
import java.util.Scanner;

public class LargestSmallest {
  public static void main(String[] args) {
    Scanner in = new Scanner(System.in);
    System.out.println("Enter the number of elements:");
    int n = in.nextInt();
    int[] arr = new int[n];
    System.out.println("Enter " + n + " numbers:");
    for (int i = 0; i < n; i++) arr[i] = in.nextInt();
    int largest = Integer.MIN_VALUE, smallest = Integer.MAX_VALUE;
    for (int i = 0; i < n; i++) {
      largest = Math.max(largest, arr[i]);
      smallest = Math.min(smallest, arr[i]);
    }
    System.out.println("Largest value = " + largest);
    System.out.println("Smallest value = " + smallest);
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\Colleg
ter\CC11\MR\Java\" ; if ($?) { java
Enter the number of elements:
5
Enter 5 numbers:
2 7 1 5 9
Largest value = 9
Smallest value = 1
```

Q2. Write a program to perform insertion and deletion operations in an array based on index.

Solution:

```
import java.util.Scanner;

class Solver {
  int[] arr;
  int size;
  int upto = -1;

  boolean canInsert(int idx) {
```

```
    if (idx < 0 || idx >= size) {
      System.out.println("Please enter a valid index value (between
0 and " + (size - 1) + ")");
      return false;
    }
    if (upto == size - 1) {
      System.out.println("Array is full!");
      return false;
    }
    if (idx > upto + 1) {
      System.out.println("Gaps are not allowed during insertion.");
      return false;
    }
    for (int i = upto; i >= idx; i--) arr[i + 1] = arr[i];
    upto++;
    return true;
  }

  boolean canDelete(int idx) {
    if (idx < 0 || idx >= size) {
      System.out.println("Please enter a valid index value (between
0 and " + (size - 1) + ")");
      return false;
    }
    if (upto == -1) {
      System.out.println("Array is empty!");
      return false;
    }
    if (idx > upto) {
      System.out.println("There is no value at that index!");
      return false;
    }
    for (int i = idx; i <= upto; i++) arr[i] = arr[i + 1];
    upto--;
    return true;
  }

  void solve() {
    Scanner in = new Scanner(System.in);
    System.out.println("Enter the capacity of the array:");
    size = in.nextInt();
    arr = new int[size];
    System.out.println("Enter the initial number of elements in the
array:");
    int n = in.nextInt();
    System.out.println("Enter the initial " + n + " elements:");
    upto = n - 1;
    for (int i = 0; i < n; i++) arr[i] = in.nextInt();
    while (true) {
```

```
System.out.println("================================================
============================");
      System.out.println("Press 1 to insert element, 2 to delete
element in the array.");
      System.out.println("Press 3 to display the array.");
      System.out.println("Press any other numeric key to exit.\n");
      System.out.println("Enter your choice:");
      int choice = in.nextInt();
      if (choice == 1) {
        System.out.println("Enter the index at which you want to
insert:");
        int idx = in.nextInt();
        if (!canInsert(idx)) continue;
        System.out.println("Enter the value to insert:");
        int value = in.nextInt();
        arr[idx] = value;
        System.out.println("Value inserted!");
      }
      else if (choice == 2) {
        System.out.println("Enter the index whose value you want to
delete:");
        int idx = in.nextInt();
        if (canDelete(idx)) System.out.println("Value deleted!");
      }
      else if (choice == 3) {
        if (upto == -1) {
          System.out.println("Array is empty!");
          continue;
        }
        System.out.println("Array is: ");
        for (int i = 0; i <= upto; i++) System.out.print(arr[i] + "
");
        System.out.println();
      }
      else {
        break;
      }
    }
  }
}

public class InsertionDeletionIndex {
  public static void main(String[] args) {
    Solver solver = new Solver();
    solver.solve();
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\MR\Java> cd "c:\Users\DARP
er\CC11\MR\Java\" ; if ($?) { javac InsertionDeletionIndex.java } ; if ($?) { jav
Enter the capacity of the array:
10
Enter the initial number of elements in the array:
6
Enter the initial 6 elements:
3 32 4 65 10 12
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
1
Enter the index at which you want to insert:
2
Enter the value to insert:
23
Value inserted!
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
3
Array is:
3 32 23 4 65 10 12
================================================================================
```

```
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
2
Enter the index whose value you want to delete:
4
Value deleted!
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
3
Array is:
3 32 23 4 10 12
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
2
Enter the index whose value you want to delete:
-1
Please enter a valid index value (between 0 and 9)
================================================================================
```

```
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
1
Enter the index at which you want to insert:
-12
Please enter a valid index value (between 0 and 9)
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
3
Array is:
3 32 23 4 10 12
================================================================================
Press 1 to insert element, 2 to delete element in the array.
Press 3 to display the array.
Press any other numeric key to exit.

Enter your choice:
5
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\MR\Java>
```

Q3. Write a program in Java to perform multiplication of two matrices.

Solution:

```
import java.util.*;

public class MatrixMultiplication {
  public static void main(String[] args) {
    Scanner in = new Scanner(System.in);
    int r1, c1, r2, c2;
    System.out.println("Enter the number of rows of the first
matrix:");
    r1 = in.nextInt();
    System.out.println("Enter the number of columns of the first
matrix:");
    c1 = in.nextInt();
    System.out.println("Enter the number of rows of the second
matrix:");
    r2 = in.nextInt();
    System.out.println("Enter the number of columns of the second
matrix:");
    c2 = in.nextInt();
    if (r1 != c2) {
      System.out.println("Matrices of dimensions " + r1 + " x " + c1
+ " and " + r2 + " x " + c2 + " cannot be multiplied!");
      return;
    }
    int[][] mat1 = new int[r1][c1];
    int[][] mat2 = new int[r2][c2];
    System.out.println("Enter the elements of the first matrix:");
    for (int i = 0; i < r1; i++) {
      for (int j = 0; j < c1; j++) {
        mat1[i][j] = in.nextInt();
      }
    }
    System.out.println("Enter the elements of the second matrix:");
    for (int i = 0; i < r2; i++) {
      for (int j = 0; j < c2; j++) {
        mat2[i][j] = in.nextInt();
      }
    }
    int[][] newMat = new int[r1][c2];
    for (int i = 0; i < r1; i++) {
      for (int j = 0; j < c2; j++) {
        for (int k = 0; k < r2; k++) {
          newMat[i][j] += mat1[i][k] * mat2[k][j];
        }
      }
    }
    System.out.println("Resultant matrix = ");
    for (int i = 0; i < r1; i++) {
      for (int j = 0; j < c2; j++) {
         System.out.print(newMat[i][j] + " ");
      }
```

```
      System.out.println();
    }
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\
er\CC11\MR\Java\" ; if ($?) { javac MatrixMultiplicatio
Enter the number of rows of the first matrix:
3
Enter the number of columns of the first matrix:
2
Enter the number of rows of the second matrix:
2
Enter the number of columns of the second matrix:
3
Enter the elements of the first matrix:
2 4
3 5
4 1
Enter the elements of the second matrix:
1 7 9
2 6 3
Resultant matrix =
10 38 30
13 51 42
6 34 39
```

Q4. Write a program to insert few integer values in an ArrayList, add 5 to each element and print.

Solution:

```
import java.util.*;

public class ArrayListAddition {
  public static void main(String[] args) {
    Scanner in = new Scanner(System.in);
    System.out.println("Enter the number of elements:");
    int n = in.nextInt();
    ArrayList<Integer> al = new ArrayList<>();
    System.out.println("Enter " + n + " elements:");
    for (int i = 0; i < n; i++) al.add(in.nextInt());
    System.out.println("ArrayList before modification = " + al);
    for (int i = 0; i < n; i++) al.set(i, al.get(i) + 5);
    System.out.println("Modified ArrayList = " + al);
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\College\5th Semester\CC1
er\CC11\MR\Java\" ; if ($?) { javac ArrayListAddition
Enter the number of elements:
5
Enter 5 elements:
3 1 4 7 9
ArrayList before modification = [3, 1, 4, 7, 9]
Modified ArrayList = [8, 6, 9, 12, 14]
```

Q5. Write a program to insert few integer values in an ArrayList, find the sum of the elements and print.

Solution:

```
import java.util.*;

public class ArrayListSum {
  public static void main(String[] args) {
    Scanner in = new Scanner(System.in);
    ArrayList<Integer> arl = new ArrayList<>();
    while (true) {
      System.out.println("Enter an integer to be added to the
arraylist; Press anything else to exit:");
      try {
        int x = in.nextInt();
        arl.add(x);
      } catch (Exception e) {
        break;
      }
    }
    int answer = 0;
    for (int i = 0; i < arl.size(); i++) answer += arl.get(i);
    System.out.println("Sum of all elements of the arraylist = " +
answer);
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\MR\Java> cd "c:\Users\DARPAN\Document
er\CC11\MR\Java\" ; if ($?) { javac ArrayListSum.java } ; if ($?) { java ArrayListSum }
Enter an integer to be added to the arraylist; Press anything else to exit:
3
Enter an integer to be added to the arraylist; Press anything else to exit:
1
Enter an integer to be added to the arraylist; Press anything else to exit:
2
Enter an integer to be added to the arraylist; Press anything else to exit:
p
Sum of all elements of the arraylist = 6
```

Q6. Write a program to perform insertion and deletion operations on an ArrayList based on index.

Solution:

```
import java.util.*;

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

```
    System.out.println("Enter the initial number of elements:");
    int n = in.nextInt();
    ArrayList<Integer> arl = new ArrayList<>();
    System.out.println("Enter " + n + " numbers:");
    for (int i = 0; i < n; i++) arl.add(in.nextInt());
    while (true) {
      System.out.println("Press 1 to insert element in list, 2 to
remove element from list.");
      System.out.println("Press 3 to view the list.");
      System.out.println("Press any other number to exit.");
      System.out.println("Enter your choice:");
      int ch = in.nextInt();
      switch (ch) {
        case 1:
        System.out.println("Enter index to insert element in (in
range [0, " + arl.size() + "])");
        int idx = in.nextInt();
        System.out.println("Enter the number to insert:");
        int x = in.nextInt();
        try {
          arl.add(idx, x);
        }
        catch(Exception e) {
          System.out.println("Invalid index entered!");
        }
        break;

        case 2:
        System.out.println("Enter index to delete element from (in
range [0, " + (arl.size() - 1) + "])");
        idx = in.nextInt();
        try {
          arl.remove(idx);
        }
        catch(Exception e) {
          System.out.println("Invalid index entered!");
        }
        break;

        case 3:
        System.out.println("List is = " + arl);
         break;

        default:
        break;
      }
      if (ch != 1 && ch != 2 && ch != 3) break;
    }
  }
}
```

Output:

```
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\MR\Java> cd "c
er\CC11\MR\Java\" ; if ($?) { javac ArrayListInsertionDeletion.java }
n }
Enter the initial number of elements:
3
Enter 3 numbers:
2 33 23
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
3
List is = [2, 33, 23]
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
1
Enter index to insert element in (in range [0, 3])
2
Enter the number to insert:
12
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
3
List is = [2, 33, 12, 23]
```

```
List is = [2, 33, 12, 23]
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
2
Enter index to delete element from (in range [0, 3])
0
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
3
List is = [33, 12, 23]
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
1
Enter index to insert element in (in range [0, 3])
5
Enter the number to insert:
122
Invalid index entered!
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
2
Enter index to delete element from (in range [0, 2])
-1
Invalid index entered!
Press 1 to insert element in list, 2 to remove element from list.
Press 3 to view the list.
Press any other number to exit.
Enter your choice:
6
PS C:\Users\DARPAN\Documents\College\5th Semester\CC11\MR\Java>
```