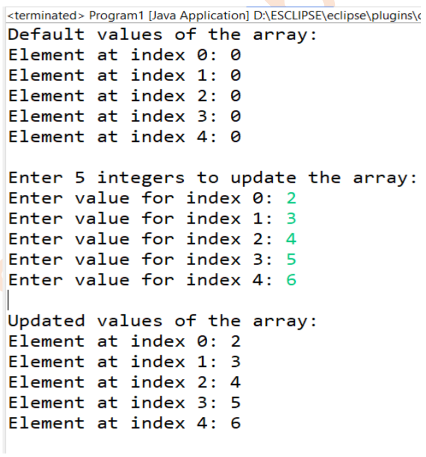
ASSIGNMENT NO.7

1. Declare a single-dimensional array of 5 integers inside the `main` method. Traverse the array to print the default values. Then accept records from the user and print the updated values of the array.
   Solution:

```
package assignment6.in;

import java.util.Scanner;
public class Program1 {
      public static void main(String[] args) {
        int[] numbers = new int[5];
        System.out.println("Default values of the array:");
        for (int i = 0; i < numbers.length; i++) {
            System.out.println("Element at index " + i + ": " + numbers[i]);
        }
        Scanner scanner = new Scanner(System.in);
        System.out.println("\nEnter 5 integers to update the array:");
        for (int i = 0; i < numbers.length; i++) {
            System.out.print("Enter value for index " + i + ": ");
            numbers[i] = scanner.nextInt();
        }
        System.out.println("\nUpdated values of the array:");
        for (int i = 0; i < numbers.length; i++) {
            System.out.println("Element at index " + i + ": " + numbers[i]);
        }
        scanner.close();
    }

}
```

Output:

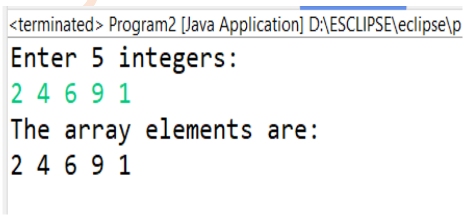


```
<terminated> Program1 [Java Application] D:\ESCLIPSE\eclipse\plugins\
Default values of the array:
Element at index 0: 0
Element at index 1: 0
Element at index 2: 0
Element at index 3: 0
Element at index 4: 0

Enter 5 integers to update the array:
Enter value for index 0: 2
Enter value for index 1: 3
Enter value for index 2: 4
Enter value for index 3: 5
Enter value for index 4: 6

Updated values of the array:
Element at index 0: 2
Element at index 1: 3
Element at index 2: 4
Element at index 3: 5
Element at index 4: 6
```

2. Declare a single-dimensional array of 5 integers inside the `main` method. Define a method named `acceptRecord` to get input from the terminal into the array and another method named `printRecord` to print the state of the array to the terminal.

Solution:

```
 package assignment2.in;

import java.util.Scanner;

public class Program2 {
  public static void acceptRecord(int[] arr) {
        Scanner scanner = new Scanner(System.in);
        System.out.println("Enter 5 integers:");
        for (int i = 0; i < arr.length; i++) {
            arr[i] = scanner.nextInt();
        }
        scanner.close();
    }

    public static void printRecord(int[] arr) {
        System.out.println("The array elements are:");
        for (int i = 0; i < arr.length; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }

    public static void main(String[] args) {

        int[] arr = new int[5];

        acceptRecord(arr);

        printRecord(arr);

    }

}
```



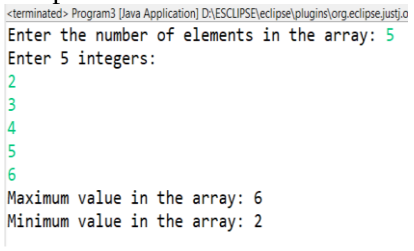
```
<terminated> Program2 [Java Application] D:\ESCLIPSE\eclipse\p
Enter 5 integers:
2 4 6 9 1
The array elements are:
2 4 6 9 1
```

3. Write a program to find the maximum and minimum values in a single-dimensional array of integers.

Solution:

```
package assignment2.in;

 import java.util.Scanner;

public class Program3 {

    public static int findMax(int[] arr) {
        int max = arr[0];
        for (int i = 1; i < arr.length; i++) {
            if (arr[i] > max) {
                max = arr[i];
            }
        }
        return max;
    }
    public static int findMin(int[] arr) {
        int min = arr[0];
        for (int i = 1; i < arr.length; i++) {
            if (arr[i] < min) {
                min = arr[i];
            }
        }
        return min;
    }

    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] arr = new int[n];

        System.out.println("Enter " + n + " integers:");
        for (int i = 0; i < arr.length; i++) {
            arr[i] = scanner.nextInt();
        }
        int max = findMax(arr);
        int min = findMin(arr);

        System.out.println("Maximum value in the array: " + max);
        System.out.println("Minimum value in the array: " + min);
        scanner.close();
    }
}
```

Output:

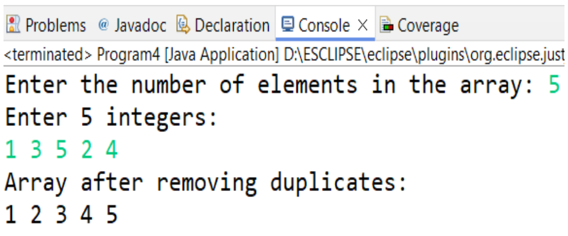


```
<terminated> Program3 [Java Application] D:\ESCLIPSE\eclipse\plugins\org.eclipse.justj.o
Enter the number of elements in the array: 5
Enter 5 integers:
2
3
4
5
6
Maximum value in the array: 6
Minimum value in the array: 2
```

4. Write a program to remove duplicate elements from a single-dimensional array of integers.

Solution:

```
package assignment4.in;

import java.util.*;
public class Program4 {
    public static int[] removeDuplicates(int[] arr) {
        Arrays.sort(arr);

        int[] temp = new int[arr.length];
        int j = 0; // Index for the temp array

        for (int i = 0; i < arr.length - 1; i++) {
            if (arr[i] != arr[i + 1]) {
                temp[j++] = arr[i];
            }
        }

        temp[j++] = arr[arr.length - 1];

        int[] uniqueArray = new int[j];
        for (int i = 0; i < j; i++) {
            uniqueArray[i] = temp[i];
        }

        return uniqueArray;
    }

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of elements in the array: ");
        int n = scanner.nextInt();
        int[] arr = new int[n];

        // Accept the elements from the user
        System.out.println("Enter " + n + " integers:");
        for (int i = 0; i < arr.length; i++) {
            arr[i] = scanner.nextInt();
        }

        // Remove duplicates and get the new array
        int[] uniqueArray = removeDuplicates(arr);

        // Display the array without duplicates
        System.out.println("Array after removing duplicates:");
        for (int i = 0; i < uniqueArray.length; i++) {
            System.out.print(uniqueArray[i] + " ");
        }
        System.out.println();
        scanner.close();
    }
}
```



```
<terminated> Program4 [Java Application] D:\ESCLIPSE\eclipse\plugins\org.eclipse.just
Enter the number of elements in the array: 5
Enter 5 integers:
1 3 5 2 4
Array after removing duplicates:
1 2 3 4 5
```

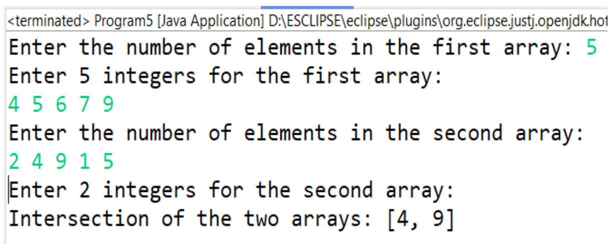
5. Write a program to find the intersection of two single-dimensional arrays.

Solution:

```
package assignment5.i

import java.util.*;

public class Program

    // Method to find the intersection of two arrays

    public static int[] findIntersection(int[] arr1, int[] arr2) {

        List<Integer> intersection = new ArrayList<>();

        for (int i = 0; i < arr1.length; i++) {

            for (int j = 0; j < arr2.length; j++) {

                if (arr1[i] == arr2[j] && !intersection.contains(arr1[i])) {

                    intersection.add(arr1[i]);
                }
            }
        }
        int[] result = new int[intersection.size()];
        for (int i = 0; i < intersection.size(); i++) {
          result[i] = intersection.get(i);
        }
        return result;
    }
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in)
        System.out.print("Enter the number of elements in the first array: ");
        int n1 = scanner.nextInt();
        int[] arr1 = new int[n1];
        System.out.println("Enter " + n1 + " integers for the first array:");
        for (int i = 0; i < n1; i++) {
            arr1[i] = scanner.nextInt();
        }
        System.out.print("Enter the number of elements in the second array: ");
        int n2 = scanner.nextInt();
        int[] arr2 = new int[n2];
        System.out.println("Enter " + n2 + " integers for the second array:");
        for (int i = 0; i < n2; i++) {
            arr2[i] = scanner.nextInt();
        }
```

```
        int[] intersection = findIntersection(arr1, arr2);

        System.out.println("Intersection of the two arrays: " + Arrays.toString(intersection));

        scanner.close();

    }

}
```

Output:

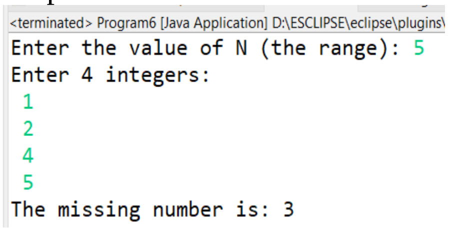


```
<terminated> Program5 [Java Application] D:\ESCLIPSE\eclipse\plugins\org.eclipse.justj.openjdk.hot
Enter the number of elements in the first array: 5
Enter 5 integers for the first array:
4 5 6 7 9
Enter the number of elements in the second array:
2 4 9 1 5
Enter 2 integers for the second array:
Intersection of the two arrays: [4, 9]
```

6. Write a program to find the missing number in an array of integers ranging from 1 to N.
Solution:

```
package assignment6.in;

import java.util.*;

public class Program6 {

    // Method
    public static int findMissingNumber(int[] arr, int N) {
        int expectedSum = N * (N + 1) / 2;  // Sum of numbers from 1 to N
        int Sum = 0;

        for (int num : arr) {
         Sum += num;
        }

        return expectedSum - Sum;
    }

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

        System.out.print("Enter the value of N (the range): ");
        int N = scanner.nextInt();
        int[] arr = new int[N - 1];  // Array size is N-1 as one number is missing
        System.out.println("Enter " + (N - 1) + " integers:");
        for (int i = 0; i < arr.length; i++) {
            arr[i] = scanner.nextInt();
        }

        int missingNumber = findMissingNumber(arr, N);
        System.out.println("The missing number is: " + missingNumber);

        scanner.close();
    }
}
```

Output:



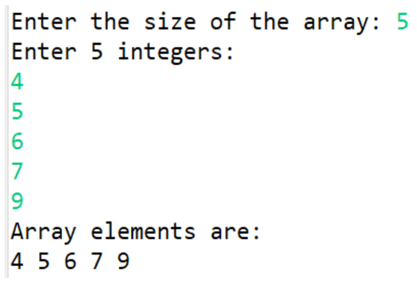
```
<terminated> Program6 [Java Application] D:\ESCLIPSE\eclipse\plugins\
Enter the value of N (the range): 5
Enter 4 integers:
 1
 2
 4
 5
The missing number is: 3
```

7. Declare a single-dimensional array as a field inside a class and instantiate it inside the class constructor. Define methods named `acceptRecord` and `printRecord` within the class and test their functionality.

Solution:

```
package assignment.in;

import java.util.Scanner;

class Array {

    private int[] arr;  // Single-dimensional array as a field

    // Constructor to instantiate the array

    public Array(int size) {

        arr = new int[size];  // Instantiate the array

    }

    public void acceptRecord() {

        Scanner scanner = new Scanner(System.in);

        System.out.println("Enter " + arr.length + " integers:");

        for (int i = 0; i < arr.length; i++) {
            arr[i] = scanner.nextInt()
        }
        scanner.close();
    }
    public void printRecord() {
        System.out.println("Array elements are:");
        for (int num : arr) {
            System.out.print(num + " ");
        }
        System.out.println();
    }
}
public class Arrray {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter the size of the array: ");
        int size = scanner.nextInt();
        Array Rahul= new Array(size);
        Rahul.acceptRecord();
       Rahul.printRecord();
        scanner.close();
    }
}
```

Output:



```
Enter the size of the array: 5
Enter 5 integers:
4
5
6
7
9
Array elements are:
4 5 6 7 9
```

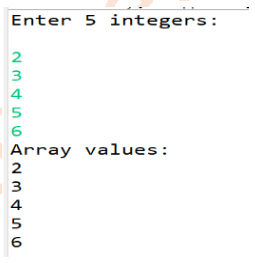
8. Modify the previous assignment to use getter and setter methods instead of `acceptRecord` and `printRecord`.

Solution:

```
package assignment.in;

        import java.util.Scanner;

        class FieldArray{

                private int[] arr;

                public FieldArray(int size) {

                        arr = new int[size];

                }

                public int[] getArr() {

                        return arr;

                }

                public void setArr(int[] arr) {

                        this.arr = arr;

                }

        }

        public class Array {

                public static void main(String[] args) {
```

```
                FieldArray a = new FieldArray(5);

                Scanner sc = new Scanner(System.in);

                System.out.println("Enter 5 integers:");

        int[] tempArr = new int[5];

        for (int i = 0; i < tempArr.length; i++) {

            tempArr[i] = sc.nextInt();

        }

        a.setArr(tempArr);

        int[] arr = a.getArr();

        System.out.println("Array values:");

        for (int value : arr) {

            System.out.println(value);

        }

        sc.close();

            }

    }
```

Output:



```
Enter 5 integers:

2
3
4
5
6
Array values:
2
3
4
5
6
```

9. You need to implement a system to manage airplane seat assignments. The airplane has seats arranged in rows and columns. Implement functionalities to:

- Initialize the seating arrangement with a given number of rows and columns.
- Book a seat to mark it as occupied.
- Cancel a booking to mark a seat as available.
- Check seat availability to determine if a specific seat is available.
- Display the current seating chart.

Solution:

1) Airplane Seat:

```
package assignment.in;

public class AirplaneSeat {

    private SeatStatus[][] seats;

    private int rows;

    private int columns;

    // Constructor to initialize the seating arrangement

    public AirplaneSeat(int rows, int columns) {

        this.rows = rows;

        this.columns = columns;

        seats = new SeatStatus[rows][columns];

        initializeSeats();

    }

    // Initialize all seats as available

    private void initializeSeats() {

        for (int i = 0; i < rows; i++) {

            for (int j = 0; j < columns; j++) {

                seats[i][j] = SeatStatus.AVAILABLE;

            }

        }

    }
```

```
// Book a seat (mark it as BOOKED)
public boolean bookSeat(int row, int column) {
    if (isValidSeat(row, column) && seats[row][column] == SeatStatus.AVAILABLE) {
        seats[row][column] = SeatStatus.BOOKED;
        return true;
    }
    return false;
}
// Cancel a seat booking (mark it as AVAILABLE)
public boolean cancelSeat(int row, int column) {
    if (isValidSeat(row, column) && seats[row][column] == SeatStatus.BOOKED) {
        seats[row][column] = SeatStatus.AVAILABLE;
        return true;
    }
    return false;
}
// Check if a specific seat is available
public boolean isSeatAvailable(int row, int column) {
    if (isValidSeat(row, column)) {
        return seats[row][column] == SeatStatus.AVAILABLE;
    }
    return false;
}
// Display the current seating chart
public void displaySeats() {
        System.out.println("\nCurrent Seating Chart:");

        for (int i = 0; i < rows; i++) {

            for (int j = 0; j < columns; j++) {

                System.out.print(seats[i][j].getSymbol() + " ");

            }

            System.out.println();

        }

    }

    // Helper method to check if the seat is within valid range

    private boolean isValidSeat(int row, int column) {

        return row >= 0 && row < rows && column >= 0 && column < columns;

    }

}
```

2) AirplaneSeatUtil:

```
package assignment.in;

import java.util.Scanner;

public class AirplaneSeatUtil {
    private static Scanner scanner = new Scanner(System.in);

    // Method to take input from user
    public static int getInput(String prompt) {
        System.out.print(prompt);
        return scanner.nextInt();
    }

    // Display menu options
    public static void displayMenu() {
        System.out.println("\nMenu:");
        System.out.println("1. Book a seat");
        System.out.println("2. Cancel a booking");
        System.out.println("3. Check seat availability");
        System.out.println("4. Display seating chart");
        System.out.println("5. Exit");
        System.out.print("Choose an option: ");
        }
    }
```

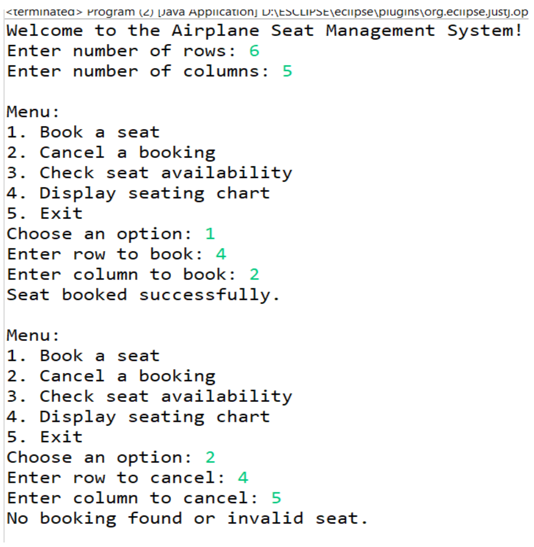
3) Seat Status

```
package assignment.in;

public enum SeatStatus {
    AVAILABLE('A'),
    BOOKED('B');

    private final char symbol;

    SeatStatus(char symbol) {
        this.symbol = symbol;
    }

    public char getSymbol() {
        return symbol;
    }
}
```

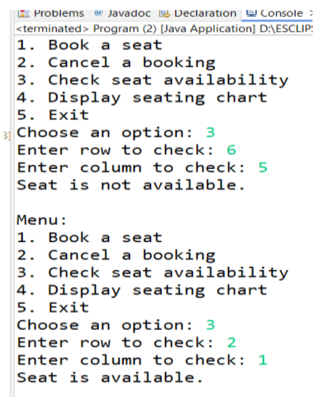
4) Program:

```
package assignment.in;

public class Program {
    public static void main(String[] args) {
        System.out.println("Welcome to the Airplane Seat Management System!");


        int rows = AirplaneSeatUtil.getInput("Enter number of rows: ");
        int columns = AirplaneSeatUtil.getInput("Enter number of columns: ");
        AirplaneSeat manager = new AirplaneSeat(rows, columns);

        boolean exit = false;
        while (!exit) {
            AirplaneSeatUtil.displayMenu();
            int choice = AirplaneSeatUtil.getInput("");

            switch (choice) {
                case 1: // Book a seat
                    int bookRow = AirplaneSeatUtil.getInput("Enter row to book: ");
                    int bookCol = AirplaneSeatUtil.getInput("Enter column to book: ");
                    if (manager.bookSeat(bookRow, bookCol)) {
                        System.out.println("Seat booked successfully.");
                    } else {
                        System.out.println("Seat already booked or invalid seat.");
                    }
                    break;
                case 2: // Cancel a booking
                    int cancelRow = AirplaneSeatUtil.getInput("Enter row to cancel: ");
                    int cancelCol = AirplaneSeatUtil.getInput("Enter column to cancel: ");
                    if (manager.cancelSeat(cancelRow, cancelCol)) {
                        System.out.println("Booking canceled successfully.");
                    } else {
                        System.out.println("No booking found or invalid seat.");
                    }
                    break;
                case 3: // Check seat availability
                    int checkRow = AirplaneSeatUtil.getInput("Enter row to check: ");
                    int checkCol = AirplaneSeatUtil.getInput("Enter column to check: ");
                    if (manager.isSeatAvailable(checkRow, checkCol)) {
                        System.out.println("Seat is available.");
                    } else {
                        System.out.println("Seat is not available.");
                    }
                    break;
                case 4: // Display seating chart
                    manager.displaySeats();
                    break;
                case 5: // Exit
                    exit = true;
                    System.out.println("Exiting system.");
                    break;
                default:
                    System.out.println("Invalid option! Please try again.");
            }
        }
    }
}
```

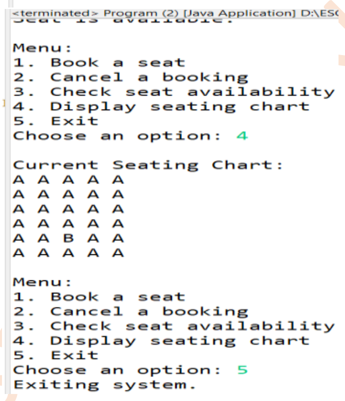
Output:



```
<terminated> Program (2) [Java Application] D:\ESCLIPSE\eclipse\plugins\org.eclipse.justj.op
Welcome to the Airplane Seat Management System!
Enter number of rows: 6
Enter number of columns: 5

Menu:
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 1
Enter row to book: 4
Enter column to book: 2
Seat booked successfully.

Menu:
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 2
Enter row to cancel: 4
Enter column to cancel: 5
No booking found or invalid seat.
```



```
Problems  Javadoc  Declaration  Console
<terminated> Program (2) [Java Application] D:\ESCLIP
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 3
Enter row to check: 6
Enter column to check: 5
Seat is not available.

Menu:
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 3
Enter row to check: 2
Enter column to check: 1
Seat is available.
```



```
<terminated> Program (2) [Java Application] D:\ESC
Seat is available.

Menu:
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 4

Current Seating Chart:
A A A A A
A A A A A
A A A A A
A A A A A
A A B A A
A A A A A

Menu:
1. Book a seat
2. Cancel a booking
3. Check seat availability
4. Display seating chart
5. Exit
Choose an option: 5
Exiting system.
```