

Assignment: 04

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SECTION – A (writing the statement/s only)

1. Write a statement that declares a reference to an array of `int`'s. The array reference should be named `numbers`.

→ `int[] numbers;`

2. Write a statement that declares and constructs an array of `Rectangle`'s named `boxes` so that the array stores exactly 10 `Rectangle` objects.

// ArrayList provides dynamic resizing capabilities, so we are using an array to store exactly 10 Rectangle objects.

→ `Rectangle[] boxes = new Rectangle[10];`

3. Write a SINGLE statement that declares a reference to an array named `grades` that stores five `double`'s. In the same statement, initialize the array to the values 44, 55, 66, 77, and 88.

→ `double[] grades = {44, 55, 66, 77, 88};`

OR, we can explicitly use decimal points to show the array has double values

→ `double[] grades = {44.0, 55.0, 66.0, 77.0, 88.0};`

4. Write a statement that assigns the value 13 to the fifth position of the array `numbers`.

// fifth position is denoted by the index no. 4 in array

→ `numbers[4] = 13;`

5. Write a statement that displays the value stored in the third position of the array `numbers`.

➔ `System.out.println("Value of the third position of array " + numbers[2]);`

6. Write a statement that displays the number of elements in the array named `numbers`.

➔ `System.out.println("The total number of elements is " + numbers.length);`

7. Write a SINGLE statement that stores the value 99 into the last position of an array named `grades` no matter how many elements it has.

➔ `grades[grades.length - 1] = 99;`

8. Write a `for` loop that assigns the integer values 1 through 10 to the first ten positions of an array named `scores`. You can assume that the array `scores` has already been declared and constructed to have 10 elements.

➔ `for(int i = 0; i<10; i++) {
 scores[i] = i + 1;
}`

9. Write a statement that declares a constructs a two-dimensional array of `int`'s named `sportsScores` that has exactly 5 rows and 4 columns.

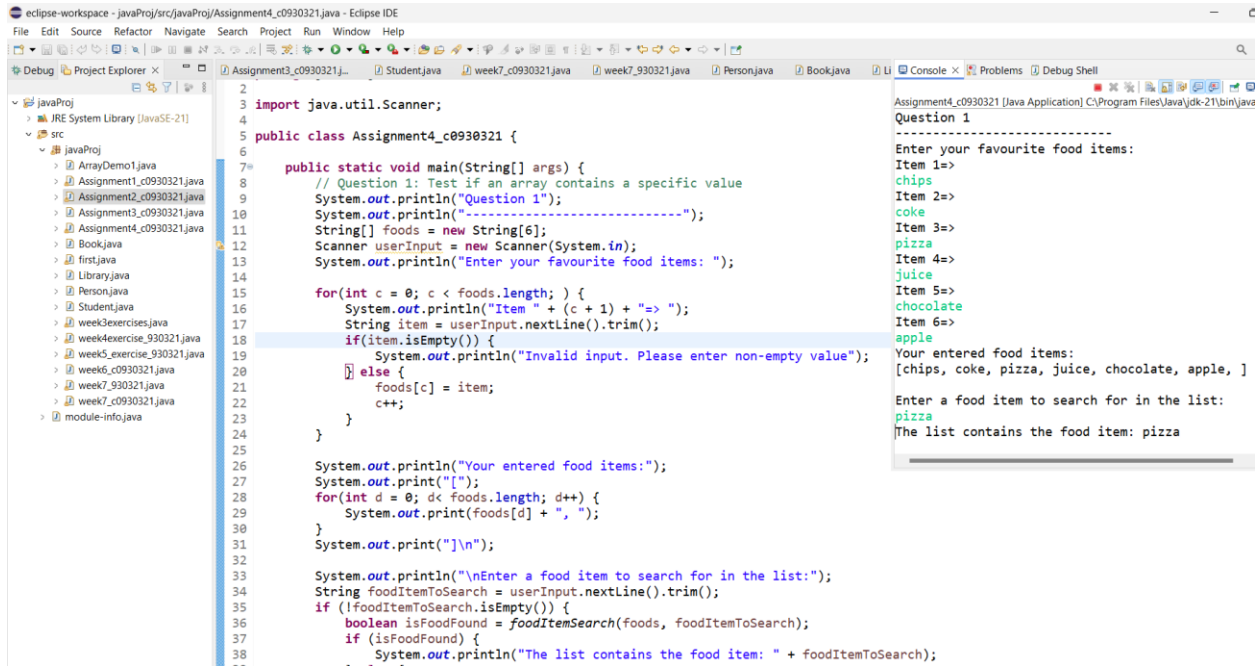
➔ `int[][] sportsScores = new int[5][4];`

10. Write a statement that assigns the value 13 to the element in the third row and the second column of the two-dimensional array named `sportsScores`.

➔ `sportsScores[2][1] = 13;`

SECTION – B (Implement the program and upload the screenshots here with each program)

1. Test if an array contains a specific value.



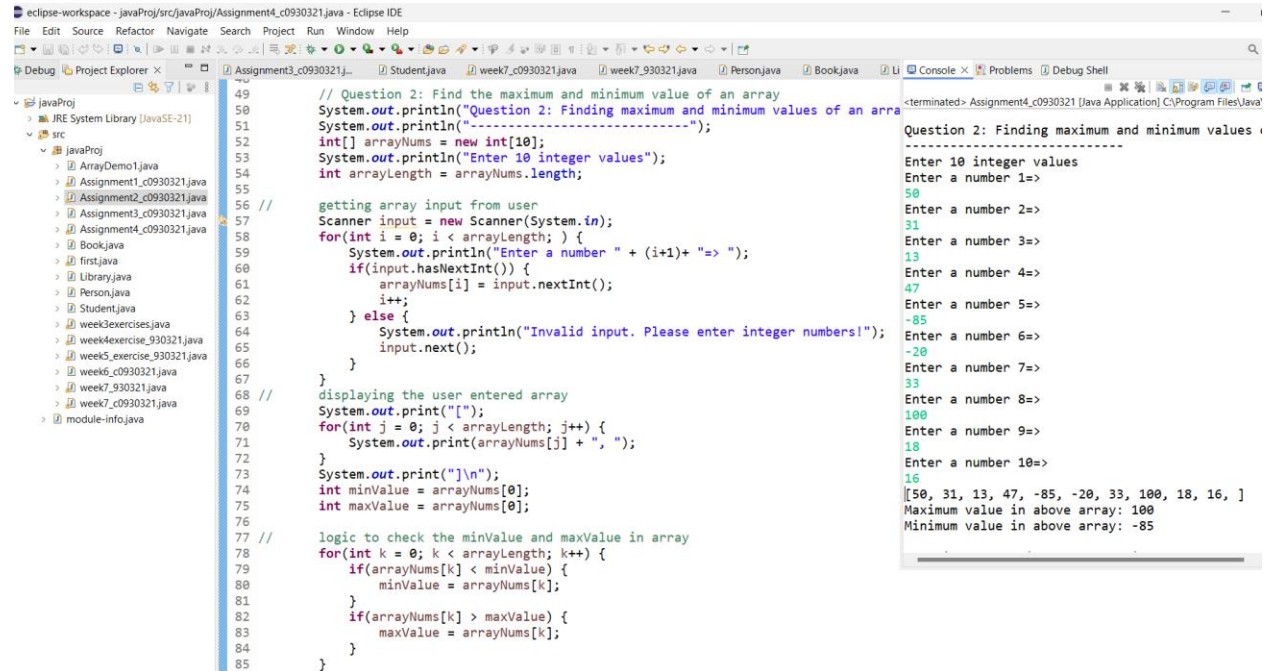
The screenshot displays the Eclipse IDE interface. The central editor shows a Java file named `Assignment4_c0930321.java` with the following code:

```
2 import java.util.Scanner;
3
4 public class Assignment4_c0930321 {
5
6     public static void main(String[] args) {
7         // Question 1: Test if an array contains a specific value
8         System.out.println("Question 1");
9         System.out.println("-----");
10        String[] foods = new String[6];
11        Scanner userInput = new Scanner(System.in);
12        System.out.println("Enter your favourite food items: ");
13
14        for(int c = 0; c < foods.length; ) {
15            System.out.println("Item " + (c + 1) + " => ");
16            String item = userInput.nextLine().trim();
17            if(item.isEmpty()) {
18                System.out.println("Invalid input. Please enter non-empty value");
19            } else {
20                foods[c] = item;
21                c++;
22            }
23        }
24
25        System.out.println("Your entered food items:");
26        System.out.print("\n");
27        for(int d = 0; d < foods.length; d++) {
28            System.out.print(foods[d] + ", ");
29        }
30        System.out.print("\n");
31
32        System.out.println("\nEnter a food item to search for in the list:");
33        String foodItemToSearch = userInput.nextLine().trim();
34        if (!foodItemToSearch.isEmpty()) {
35            boolean isFoodFound = foodItemSearch(foods, foodItemToSearch);
36            if (isFoodFound) {
37                System.out.println("The list contains the food item: " + foodItemToSearch);
38            }
39        }
40    }
41}
```

The console on the right shows the program's execution:

```
Assignment4_c0930321 [Java Application] C:\Program Files\Java\jdk-21\bin\java
Question 1
-----
Enter your favourite food items:
Item 1=>
chips
Item 2=>
coke
Item 3=>
pizza
Item 4=>
juice
Item 5=>
chocolate
Item 6=>
apple
Your entered food items:
[chips, coke, pizza, juice, chocolate, apple, ]
Enter a food item to search for in the list:
pizza
The list contains the food item: pizza
```

2. Find the maximum and minimum value of an array.



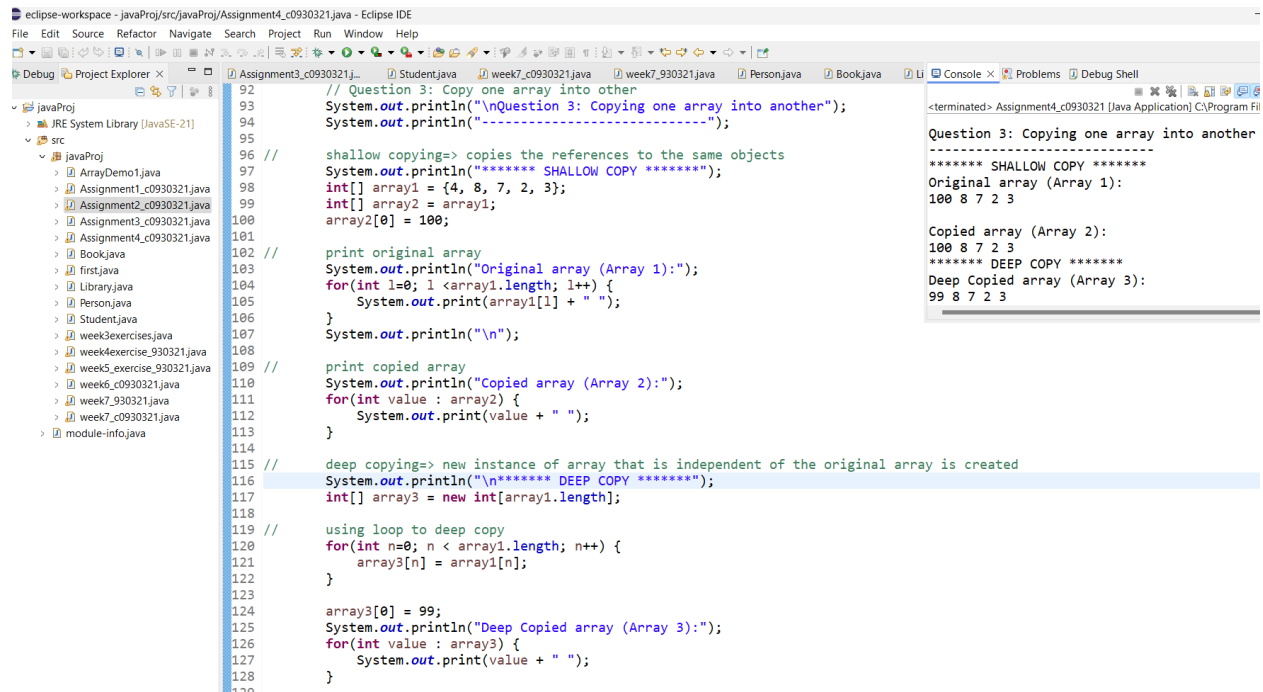
The screenshot shows the Eclipse IDE with a Java project named 'javaProj'. The source code for 'Assignment4_c0930321.java' is displayed in the editor. The code prompts the user to enter 10 integer values, reads them into an array, and then finds the maximum and minimum values. The console output shows the user's input and the resulting maximum and minimum values.

```
49 // Question 2: Find the maximum and minimum value of an array
50 System.out.println("Question 2: Finding maximum and minimum values of an array");
51 System.out.println("-----");
52 int[] arrayNums = new int[10];
53 System.out.println("Enter 10 integer values");
54 int arrayLength = arrayNums.length;
55
56 // getting array input from user
57 Scanner input = new Scanner(System.in);
58 for(int i = 0; i < arrayLength; i++) {
59     System.out.println("Enter a number " + (i+1) + " => ");
60     if(input.hasNextInt()) {
61         arrayNums[i] = input.nextInt();
62         i++;
63     } else {
64         System.out.println("Invalid input. Please enter integer numbers!");
65         input.next();
66     }
67 }
68 // displaying the user entered array
69 System.out.print("[");
70 for(int j = 0; j < arrayLength; j++) {
71     System.out.print(arrayNums[j] + ", ");
72 }
73 System.out.print("\n");
74 int minValue = arrayNums[0];
75 int maxValue = arrayNums[0];
76
77 // logic to check the minValue and maxValue in array
78 for(int k = 0; k < arrayLength; k++) {
79     if(arrayNums[k] < minValue) {
80         minValue = arrayNums[k];
81     }
82     if(arrayNums[k] > maxValue) {
83         maxValue = arrayNums[k];
84     }
85 }
```

Console Output:

```
<terminated> Assignment4_c0930321 [Java Application] C:\Program Files\Java\
Question 2: Finding maximum and minimum values of an array
-----
Enter 10 integer values
Enter a number 1=> 50
Enter a number 2=> 31
Enter a number 3=> 13
Enter a number 4=> 47
Enter a number 5=> -85
Enter a number 6=> -20
Enter a number 7=> 33
Enter a number 8=> 100
Enter a number 9=> 18
Enter a number 10=> 16
[50, 31, 13, 47, -85, -20, 33, 100, 18, 16, ]
Maximum value in above array: 100
Minimum value in above array: -85
```

3. Copy one array into other array.



The screenshot shows the Eclipse IDE with a Java project named 'javaProj'. The 'src' folder contains several Java files, including 'Assignment3_c0930321.java'. The code in this file demonstrates two methods of copying an array: shallow copying and deep copying.

```
92 // Question 3: Copy one array into other
93 System.out.println("\nQuestion 3: Copying one array into another");
94 System.out.println("-----");
95
96 // shallow copying=> copies the references to the same objects
97 System.out.println("***** SHALLOW COPY *****");
98 int[] array1 = {4, 8, 7, 2, 3};
99 int[] array2 = array1;
100 array2[0] = 100;
101
102 // print original array
103 System.out.println("Original array (Array 1):");
104 for(int l=0; l < array1.length; l++) {
105     System.out.print(array1[l] + " ");
106 }
107 System.out.println("\n");
108
109 // print copied array
110 System.out.println("Copied array (Array 2):");
111 for(int value : array2) {
112     System.out.print(value + " ");
113 }
114
115 // deep copying=> new instance of array that is independent of the original array is created
116 System.out.println("\n***** DEEP COPY *****");
117 int[] array3 = new int[array1.length];
118
119 // using loop to deep copy
120 for(int n=0; n < array1.length; n++) {
121     array3[n] = array1[n];
122 }
123
124 array3[0] = 99;
125 System.out.println("Deep Copied array (Array 3):");
126 for(int value : array3) {
127     System.out.print(value + " ");
128 }
129
```

The console output on the right shows the execution results:

```
<terminated> Assignment4_c0930321 [Java Application] C:\Program Fil
-----
Question 3: Copying one array into another
***** SHALLOW COPY *****
Original array (Array 1):
100 8 7 2 3

Copied array (Array 2):
100 8 7 2 3
***** DEEP COPY *****
Deep Copied array (Array 3):
99 8 7 2 3
```