WEEK 6

Question 1: Write a Java program to print the odd numbers from 1 to 99.

Code:

```java
public class One {
    Run | Debug
    public static void main(String[] args) {
        System.out.print(s:"Odd numbers from 1 to 99:  ");
        for (int i = 1; i ⩽ 99; i += 2) {
            System.out.print(i + " ");
        }
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac One.java
PS D:\UNI Material\LAB\sem 3\Week 6> java One
Odd numbers from 1 to 99:  1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99
```

Question 2: Write a Java program to check whether a number is prime or not.

Code:

```java
import java.util.Scanner;
public class Two {
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter a number: ");
        int num = sc.nextInt();
        sc.close();
        boolean isPrime = true;
        int numsqrt = (int)Math.sqrt(num);
        for(int i = 2; i ⩽ numsqrt; i++){
            if (num % i == 0) {
                isPrime = false;
                break;
            }
        }
        if(isPrime)
            System.out.println(num + " is a prime number");
        else
            System.out.println(num + " is not a prime number");
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Two.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Two
Enter a number: 553
553 is not a prime number
```

Question 3: Write a Java program to swap the first and last elements of an array.

Code:

```java
import java.util.Scanner;
public class Three {
    public static void printArray(int[] arr, int size) {
        for (int i = 0; i < size; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int n = sc.nextInt();
        if (n <= 0) {
            System.out.println(x:"Invalid size! Array size must be at least 1.");
            sc.close();
            return;
        }
        int[] arr = new int[n];
        System.out.print("Enter " + n + " elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        sc.close();
        System.out.print(s:"Original Array: ");
        printArray(arr, n);
        if (n == 1) {
            System.out.println(x:"Only one element, no swap needed.");
        } else {
            int temp = arr[0];
            arr[0] = arr[n - 1];
            arr[n - 1] = temp;
            System.out.print(s:"Array after swapping: ");
            printArray(arr, n);
        }
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Three.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Three
Enter size of array: 5
Enter 5 elements: 12 87 45 96 33
Original Array: 12 87 45 96 33
Array after swapping: 33 87 45 96 12
```

Question 4: Write a Java program to find the maximum and minimum among array elements.

Code:

```java
import java.util.Scanner;
public class Four {
    public static void printArray(int[] arr, int size) {
        for (int i = 0; i < size; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int n = sc.nextInt();
        if (n <= 0) {
            System.out.println(x:"Invalid size! Array size must be at least 1.");
            sc.close(); return;
        }
        int[] arr = new int[n];
        System.out.print("Enter " + n + " elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        sc.close();
        System.out.print(s:"Original Array: ");
        printArray(arr, n);
        int max = arr[0], min = arr[0];
        for(int i = 1; i < n; i++){
            max = (arr[i] > max)? arr[i] : max;
            min = (arr[i] < min)? arr[i] : min;
        }
        System.out.println("Maximum Element: " + max + "\nMinimum Element: " + min);
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Four.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Four
Enter size of array: 6
Enter 6 elements: 52 14 78 69 83 09
Original Array: 52 14 78 69 83 9
Maximum Element: 83
Minimum Element: 9
```

Question 5: Write a Java program to print all prime numbers between 0 to 100.

Code:

```java
public class Five
{
    Run main | Debug main | Run | Debug
    public static void main(String[] args) {
        System.out.println(x:"Prime numbers between 0 and 100:");
        for (int num = 2; num <= 100; num++) {
            boolean isPrime = true;
            for (int i = 2; i * i <= num; i++) {
                if (num % i == 0) {
                    isPrime = false;
                    break;
                }
            }
            if (isPrime) {
                System.out.print(num + " ");
            }
        }
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Five.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Five
Prime numbers between 0 and 100:
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97
```

Question 6: Write a Java program to implement linear search.

Code:

```java
import java.util.Scanner;
public class Six {
    public static void printArray(int[] arr, int size) {
        for (int i = 0; i < size; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int n = sc.nextInt();
        if (n <= 0) {
            System.out.println(x:"Invalid size! Array size must be at least 1.");
            sc.close(); return;
        }
        int[] arr = new int[n];
        System.out.print("Enter " + n + " elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        System.out.print(s:"Original Array: ");
        printArray(arr, n);
```

Code:

```
25          System.out.print(s:"Enter key to search in array: ");
26          int key = sc.nextInt();
27          boolean flag = false;
28          for (int i = 0; i < arr.length; i++) {
29              if (arr[i] == key) {
30                  System.out.println("Element found at position: " + (i + 1));
31                  flag = true; break;
32              }
33          }
34          if(!flag)
35              System.out.println(x:"Element not present in array.");
36          sc.close();
37      }
38  }
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Six.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Six
Enter size of array: 5
Enter 5 elements: 94 81 45 66 21
Original Array: 94 81 45 66 21
Enter key to search in array: 45
Element found at position: 3
```

Optional

Question 7: Write a Java program to print all prime numbers between 0 to 100.

Code:

```
1   public class Seven {
        Run main | Debug main | Run | Debug
2       public static void main(String[] args) {
3           System.out.println(x:"Prime numbers between 0 and 100:");
4           for (int num = 2; num <= 100; num++) {
5               boolean isPrime = true;
6               for (int i = 2; i * i <= num; i++) {
7                   if (num % i == 0) {
8                       isPrime = false;
9                       break;
10                  }
11              }
12              if (isPrime) {
13                  System.out.print(num + " ");
14              }
15          }
16      }
17  }
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Seven.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Seven
Prime numbers between 0 and 100:
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97
```

Question 8: Write a Java program to find the second largest element in an array.

Code:

```java
import java.util.Scanner;
public class Eight {
    public static void printArray(int[] arr, int size) {
        for (int i = 0; i < size; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int n = sc.nextInt();
        if (n < 2) {
            System.out.println(x:"Array must have at least 2 elements.");
            sc.close();
            return;
        }
        int[] arr = new int[n];
        System.out.print("Enter " + n + " elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
        sc.close();
        System.out.print(s:"Array: ");
        printArray(arr, n);
        int largest = Integer.MIN_VALUE;
        int secondLargest = Integer.MIN_VALUE;
        for (int i = 0; i < n; i++) {
            if (arr[i] > largest) {
                secondLargest = largest;
                largest = arr[i];
            } else if (arr[i] > secondLargest && arr[i] < largest) {
                secondLargest = arr[i];
            }
        }
        if (secondLargest == Integer.MIN_VALUE) {
            System.out.println(x:"No second largest element!");
        } else
            System.out.println("Largest Element: " + largest + " and Second Largest Element: " + secondLargest);
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Eight.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Eight
Enter size of array: 5
Enter 5 elements: 14 25 32 78 94
Array: 14 25 32 78 94
Largest Element: 94 and Second Largest Element: 78
```

Question 9: Write a program to implement Fibonacci series up to N terms (0,1,1,2,3,5....).

Code:

```java
import java.util.Scanner;
public class Nine {
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter number of terms: ");
        int n = sc.nextInt();
        if (n ⩽ 0) {
            System.out.println(x:"Invalid input! n must be ⩾ 1.");
        } else {
            int first = 0, second = 1;
            for (int i = 1; i ⩽ n; i++) {
                int next = first + second;
                System.out.print(first + " ");
                first = second;
                second = next;
            }
        }
        sc.close();
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Nine.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Nine
Enter number of terms: 9
0 1 1 2 3 5 8 13 21
```

Question 10: Write a Java program to reverse all elements of an array.

Code:

```java
import java.util.Scanner;
public class Ten {
    public static void printArray(int[] arr, int size) {
        for (int i = 0; i < size; i++) {
            System.out.print(arr[i] + " ");
        }
        System.out.println();
    }
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter size of array: ");
        int n = sc.nextInt();
        if (n ⩽ 0) {
            System.out.println(x:"Invalid size! Array size must be at least 1.");
            sc.close(); return;
        }
        int[] arr = new int[n];
        System.out.print("Enter " + n + " elements: ");
        for (int i = 0; i < n; i++) {
            arr[i] = sc.nextInt();
        }
```

Code:

```
        sc.close();
        System.out.print(s:"Original Array: ");
        printArray(arr, n);
        System.out.print(s:"Reversed Array: ");
        for (int i = 0; i < n/2; i++) {
            int temp = arr[i];
            arr[i] = arr[n - 1 - i];
            arr[n - 1 - i] = temp;
        } printArray(arr, n);
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Ten.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Ten
Enter size of array: 5
Enter 5 elements: 1 4 8 9 2
Original Array: 1 4 8 9 2
Reversed Array: 2 9 8 4 1
```

Question 11: Write a Java program to find the frequency of each character in a given string.

Code:

```
import java.util.HashMap;
import java.util.Scanner;
public class Eleven {
    Run main | Debug main
    @SuppressWarnings("ConvertToTryWithResources")
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print(s:"Enter a string: ");
        String str = sc.nextLine();
        sc.close();
        HashMap<Character, Integer> freq = new HashMap<>();

        for (int i = 0; i < str.length(); i++) {
            char ch = str.charAt(i);
            freq.put(ch, freq.getOrDefault(ch, defaultValue:0) + 1);
        }
        System.out.println(x:"Character frequencies:");
        for (char key : freq.keySet()) {
            if (key == ' ')
                System.out.println("Spaces: " + freq.get(key));
            else
                System.out.println(key + " : " + freq.get(key));
        }
    }
}
```

Output:

```
PS D:\UNI Material\LAB\sem 3\Week 6> javac Eleven.java
PS D:\UNI Material\LAB\sem 3\Week 6> java Eleven
Enter a string: "The supreme art of war is to subdue the enemy without fighting".
Character frequencies:
Spaces: 11
a : 2
" : 2
b : 1
d : 1
e : 7
f : 2
g : 2
h : 4
i : 4
m : 2
n : 2
. : 1
o : 3
p : 1
r : 3
s : 3
T : 1
t : 6
u : 4
w : 2
y : 1
```