

C-DAC Mumbai

Lab Assignment-4

Answers

Question 1: Print Numbers from 1 to N

Problem Statement: Write a Java program that asks the user for a number N and then prints the numbers from 1 to N using a for loop.

Sample Input:

Enter a number: 10

Expected Output:

1 2 3 4 5 6 7 8 9 10

```
import java.util.Scanner;
public class Q1 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        for(int i=1;i<=n;i++) System.out.print(i+" ");
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q1.java
PS C:\Users\baenu\test> java Q1
8
1 2 3 4 5 6 7 8
```

Question 2: Print Multiples of 3 between 1 and N

Problem Statement: Write a Java program that asks the user for a number N and prints all the multiples of 3 between 1 and N using a for loop.

Sample Input:

Enter a number: 20

Expected Output:

3 6 9 12 15 18

```
import java.util.Scanner;
public class Q2 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        for(int i=3;i<=n;i+=3) System.out.print(i+" ");
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q2.java
PS C:\Users\baenu\test> java Q2
9
3 6 9
```

Question 3: Calculate the Factorial of a Number

Problem Statement: Write a Java program that asks the user for a number N and calculates the factorial of N using a for loop.

Sample Input:

Enter a number: 5

Expected Output:

Factorial of 5 is 120

```
import java.util.Scanner;
public class Q3 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt(), fact=1;
        for(int i=1;i<=n;i++) fact*=i;
        System.out.println("Factorial of "+n+" is "+fact);
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q3.java
PS C:\Users\baenu\test> java Q3
6
Factorial of 6 is 720
```

Question 4: Print Even Numbers from 1 to N

Problem Statement: Write a Java program that asks the user for a number N and prints all the even numbers from 1 to N using a for loop.

Sample Input:

Enter a number: 10

Expected Output:

2 4 6 8 10

```
import java.util.Scanner;
public class Q4 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        for(int i=2;i<=n;i+=2) System.out.print(i+" ");
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q4.java
PS C:\Users\baenu\test> java Q4
20
2 4 6 8 10 12 14 16 18 20
```

Question 5: Sum of Odd Numbers between 1 and N

Problem Statement: Write a Java program that asks the user for a number N and calculates the sum of all odd numbers between 1 and N using a for loop.

Sample Input:

Enter a number: 10

Expected Output:

The sum of odd numbers from 1 to 10 is: 25

```
import java.util.Scanner;
public class Q5 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt(), sum=0;
        for(int i=1;i<=n;i+=2) sum+=i;
        System.out.println("The sum of odd numbers from 1 to "+n+" is: "+sum);
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q5.java
PS C:\Users\baenu\test> java Q5
15
The sum of odd numbers from 1 to 15 is: 64
```

Question 6: Print All Elements of an Array

Problem Statement: Write a Java program that uses a **for-each** loop to print all elements of an integer array. The program should ask the user to input 5 integers, store them in an array, and then print all the elements using a **for-each** loop.

Sample Input:

Enter 5 integers: 3 7 12 5 8

Expected Output:

3 7 12 5 8

```
import java.util.Scanner;
public class Q6 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        for(int x:arr) System.out.print(x+" ");
        sc.close();
    }
}
```

```
PS C:\Users\baenu\test> javac Q6.java
PS C:\Users\baenu\test> java Q6
2 4 8 10 12
2 4 8 10 12
```

Question 7: Find the Sum of All Elements in an Array

Problem Statement: Write a Java program that uses a **for-each** loop to calculate the sum of all elements in a given integer array. The program should ask the user to input 5 integers, store them in an array, and then compute the sum of these numbers using the **for-each** loop.

Sample Input:

Enter 5 integers: 4 6 8 2 10

Expected Output:

The sum of all numbers is: 30

```
import java.util.Scanner;
public class Q7 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        int sum=0;
        for(int x:arr) sum+=x;
        System.out.println("The sum of all numbers is: "+sum);
    }
}
PS C:\Users\baenu\test> javac Q7.java
PS C:\Users\baenu\test> java Q7
4 9 12 20 17
The sum of all numbers is: 62
```

Question 8: Print All Names in a String Array

Problem Statement: Write a Java program that uses a **for-each** loop to print all the names stored in a String array. The program should ask the user to input 4 names, store them in an array, and then print each name using the **for-each** loop.

Sample Input:

Enter 4 names: Manoj Aditya Shilbhushan Shweta

Expected Output:

Manoj

Aditya

Shilbhushan

Shweta

```

import java.util.Scanner;
public class Q8 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        String[] names = new String[4];
        for(int i=0;i<4;i++) names[i]=sc.next();
        for(String s:names) System.out.println(s);
    }
}

```

```

PS C:\Users\baenu\test> javac Q8.java
PS C:\Users\baenu\test> java Q8
Krishna Raj Rahul Rohini
Krishna
Raj
Rahul
Rohini

```

Question 9: Find the Largest Element in an Array

Problem Statement: Write a Java program that asks the user to input 5 integers, stores them in an array, and then finds and prints the largest element in the array. (Explore in-built method to solve this)

Sample Input:

Enter 5 integers: 12 45 67 23 89

Expected Output:

The largest element is: 89

```

import java.util.*;
public class Q9 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Integer[] arr = new Integer[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        int max = Collections.max(Arrays.asList(arr));
        System.out.println("The largest element is: "+max);
    }
}

```

```

PS C:\Users\baenu\test> javac Q9.java
PS C:\Users\baenu\test> java Q9
20 13 52 34 6
The largest element is: 52

```

Question 10: Find the Average of Elements in an Array

Problem Statement: Write a Java program that asks the user to input 5 integers, stores them in an array, and then calculates and prints the average of the elements in the array.

Sample Input:

Enter 5 integers: 10 20 30 40 50

Expected Output:

The average of the numbers is: 30.0

```
import java.util.Scanner;
public class Q10 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        int sum=0;
        for(int i=0;i<5;i++) {arr[i]=sc.nextInt(); sum+=arr[i];}
        System.out.println("The average of the numbers is: "+(sum/5.0));
    }
}

PS C:\Users\baenu\test> javac Q10.java
PS C:\Users\baenu\test> java Q10
2 4 6 8 10
The average of the numbers is: 6.0
```

Question 11: Count Positive and Negative Numbers in an Array

Problem Statement: Write a Java program that asks the user to input 6 integers, stores them in an array, and then counts how many positive and negative numbers are present in the array.

Sample Input:

Enter 6 integers: -5 3 7 -2 0 8

Expected Output:

Positive numbers: 3

Negative numbers: 2

```
import java.util.Scanner;
public class Q11 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[6];
        int pos=0,neg=0;
        for(int i=0;i<6;i++) {
            arr[i]=sc.nextInt();
            if(arr[i]>0) pos++;
            else if(arr[i]<0) neg++;
        }
        System.out.println("Positive numbers: "+pos);
        System.out.println("Negative numbers: "+neg);
    }
}
```

```
PS C:\Users\baenu\test> javac Q11.java
PS C:\Users\baenu\test> java Q11
-12 9 2 -5 13 27
Positive numbers: 4
Negative numbers: 2
```

Question 12: Sort an Array in Ascending Order

Problem Statement: Write a Java program that asks the user to input 5 integers, stores them in an array, and then sorts the array in ascending order using the `Arrays.sort()` method. After sorting, print the sorted array.

Sample Input:

Enter 5 integers: 12 45 23 8 90

Expected Output:

Sorted array: 8 12 23 45 90

```
import java.util.*;
public class Q12 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        Arrays.sort(arr);
        System.out.print(s:"Sorted array: ");
        for(int x:arr) System.out.print(x+" ");
    }
}
```

```
PS C:\Users\baenu\test> javac Q12.java
PS C:\Users\baenu\test> java Q12
50 24 62 10 38
Sorted array: 10 24 38 50 62
```

Question 13: Check if an Array Contains a Specific Element

Problem Statement: Write a Java program that asks the user to input 5 integers, stores them in an array, and then checks whether a specific number (input by the user) is present in the array using the `Arrays.asList()` method. If the number is found, print "Found", otherwise print "Not Found".

Sample Input:

Enter 5 integers: 10 20 30 40 50

Enter the number to search: 30

Expected Output:

Found

```

import java.util.*;
public class Q13 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        Integer[] arr = new Integer[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        int num = sc.nextInt();
        if(Arrays.asList(arr).contains(num)) System.out.println(x:"Found");
        else System.out.println(x:"Not Found");
    }
}

```

```

PS C:\Users\baenu\test> javac Q13.java
PS C:\Users\baenu\test> java Q13
8 14 20 10 18
18
Found

```

Question 14: Find the Index of an Element in an Array

Problem Statement: Write a Java program that asks the user to input 5 integers, stores them in an array, and then finds the index of a specific number (input by the user) using the `Arrays.binarySearch()` method. If the number is found, print the index, otherwise print "Not Found".

Sample Input:

Enter 5 integers: 5 10 15 20 25

Enter the number to search: 15

Expected Output:

The number 15 is found at index 2

```

import java.util.*;
public class Q14 {
    Run | Debug
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int[] arr = new int[5];
        for(int i=0;i<5;i++) arr[i]=sc.nextInt();
        Arrays.sort(arr);
        int num = sc.nextInt();
        int index = Arrays.binarySearch(arr,num);
        if(index>=0) System.out.println("The number "+num+" is found at index "+index);
        else System.out.println(x:"Not Found");
    }
}

```

```

PS C:\Users\baenu\test> javac Q14.java
PS C:\Users\baenu\test> java Q14
4 9 15 20 18
9
The number 9 is found at index 1

```


Question 15: Write a program to print the following pattern:

```
1
2*2
3*3*3
4*4*4*4
5*5*5*5*5
4*4*4*4
3*3*3
2*2
1
```

```
public class Q15 {
    public static void main(String[] args) {
        int n = 5;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(i);
                if (j < i) System.out.print("*");
            }
            System.out.println();
        }
        for (int i = n - 1; i >= 1; i--) {
            for (int j = 1; j <= i; j++) {
                System.out.print(i);
                if (j < i) System.out.print("*");
            }
            System.out.println();
        }
    }
}
```

```
PS C:\Users\baenu\Test> javac Q15.java
PS C:\Users\baenu\Test> java Q15
1
2*2
3*3*3
4*4*4*4
5*5*5*5*5
4*4*4*4
3*3*3
2*2
1
```

Question 16: Write a program to print the following pattern:

```
1
1*2
1*2*3
1*2*3*4
1*2*3*4*5
```

```

public class Q16 {
    public static void main(String[] args) {
        int n = 5;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(j);
                if (j < i) System.out.print("*");
            }
            System.out.println();
        }
    }
}

```

```

PS C:\Users\baenu\Test> javac Q16.java
PS C:\Users\baenu\Test> java Q16
1
1*2
1*2*3
1*2*3*4
1*2*3*4*5

```

Question 17: Write a program to print the following pattern:

```

1
1*3
1*3*5
1*3*5*7
1*3*5*7*9

```

```

public class Q17 {
    public static void main(String[] args) {
        int n = 5, num = 1;
        for (int i = 1; i <= n; i++) {
            num = 1;
            for (int j = 1; j <= i; j++) {
                System.out.print(num);
                if (j < i) System.out.print("*");
                num += 2;
            }
            System.out.println();
        }
    }
}

```

```

PS C:\Users\baenu\Test> javac Q17.java
PS C:\Users\baenu\Test> java Q17
1
1*3
1*3*5
1*3*5*7
1*3*5*7*9

```

Question 18: Write a program to print the following pattern:

11111
22222
33333
44444
55555

```
public class Q18 {  
    public static void main(String[] args) {  
        int n = 5;  
        for (int i = 1; i <= n; i++) {  
            for (int j = 1; j <= n; j++) {  
                System.out.print(i);  
            }  
            System.out.println();  
        }  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q18.java
```

```
PS C:\Users\baenu\Test> java Q18
```

11111
22222
33333
44444
55555

Question 19: Write a program to print the following pattern:

1
22
333
4444
55555

```
public class Q19 {  
    public static void main(String[] args)  
    {  
        int n = 5;  
        for (int i = 1; i <= n; i++) {  
            for (int j = 1; j <= i; j++) {  
                System.out.print(i);  
            }  
            System.out.println();  
        }  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q19.java
PS C:\Users\baenu\Test> java Q19
1
22
333
4444
55555
```

Question 20: Write a program to print the following pattern:

```
1
12
123
1234
12345
```

```
public class Q20 {
    public static void main(String[] args) {
        int n = 5;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(j);
            }
            System.out.println();
        }
    }
}

PS C:\Users\baenu\Test> javac Q20.java
PS C:\Users\baenu\Test> java Q20
1
12
123
1234
12345
```

Question 21: Write a program to print the following pattern:

```
1
23
456
78910
11 12 13 14 15
```

```

public class Q21 {
    public static void main(String[] args) {
        int n = 5, num = 1;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= i; j++) {
                System.out.print(num + " ");
                num++;
            }
            System.out.println();
        }
    }
}

```

```

PS C:\Users\baenu\Test> javac Q21.java
PS C:\Users\baenu\Test> java Q21
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15

```

Question 22: Write a program to print the following pattern:

```

*****
*   *
*   *
*   *
*****

```

```

public class Q22 {
    public static void main(String[] args) {
        int n = 5;
        for (int i = 1; i <= n; i++) {
            for (int j = 1; j <= n; j++) {
                if (i == 1 || i == n || j == 1 || j == n) System.out.print("*");
                else System.out.print(" ");
            }
            System.out.println();
        }
    }
}

```

```

PS C:\Users\baenu\Test> javac Q22.java
PS C:\Users\baenu\Test> java Q22
*****
*   *
*   *
*   *
*****

```

Question 23: Write a program to print the following pattern:

```

    *
  ***
 *****
 *******
*****
 *******
 *****
  *****
   ****
    ***
     *
```

```
public class Q23 {
    public static void main(String[] args) {
        int n = 6;
        for (int i = 1; i <= n; i++) {
            for (int j = i; j < n; j++) System.out.print(" ");
            for (int j = 1; j <= (2 * i - 1); j++) System.out.print("*");
            System.out.println();
        }
        for (int i = n - 1; i >= 1; i--) {
            for (int j = n; j > i; j--) System.out.print(" ");
            for (int j = 1; j <= (2 * i - 1); j++) System.out.print("*");
            System.out.println();
        }
    }
}
```

```
PS C:\Users\baenu\Test> javac Q23.java
PS C:\Users\baenu\Test> java Q23
```

```

    *
  ***
 *****
 *******
*****
 *******
 *****
  *****
   ****
    ***
     *
```

Question 24: Reverse a String

Problem Statement: Write a Java program that asks the user for a string and then prints the reverse of that string.

Sample Input:

Enter a string: hello

Expected Output:

Reversed string: olleh

```
import java.util.Scanner;
class Q24 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String str = sc.nextLine();
        String reversed = new StringBuilder(str).reverse().toString();
        System.out.println("Reversed string: " + reversed);
    }
}
```

```
PS C:\Users\baenu\Test> javac Q24.java
PS C:\Users\baenu\Test> java Q24
Enter a string: programming
Reversed string: gnimmargorp
```

Question 25: Count Vowels in a String

Problem Statement: Write a Java program that asks the user for a string and counts the number of vowels (a, e, i, o, u) in the string. The program should then print the total number of vowels.

Sample Input:

Enter a string: programming

Expected Output:

The number of vowels in 'programming' is: 3

```
import java.util.Scanner;
class Q25 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String str = sc.nextLine().toLowerCase();
        int count = 0;
        for (char c : str.toCharArray()) {
            if ("aeiou".indexOf(c) != -1) count++;
        }
        System.out.println("The number of vowels in '" + str + "' is: " + count);
    }
}
```

```
PS C:\Users\baenu\Test> javac Q25.java
PS C:\Users\baenu\Test> java Q25
Enter a string: galileo
The number of vowels in 'galileo' is: 4
```

Question 26: Check if a String is a Palindrome

Problem Statement: Write a Java program that asks the user for a string and checks whether the string is a palindrome. A palindrome is a string that reads the same backward as forward (ignoring spaces and punctuation).

Sample Input:

Enter a string: madam

Expected Output:

The string 'madam' is a palindrome.

```
import java.util.Scanner;
class Q26 {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter a string: ");
        String str = sc.nextLine().replaceAll("[^a-zA-Z0-9]", "").toLowerCase();
        String reversed = new StringBuilder(str).reverse().toString();
        if (str.equals(reversed))
            System.out.println("The string '" + str + "' is a palindrome.");
        else
            System.out.println("The string '" + str + "' is not a palindrome.");
    }
}
```

```
PS C:\Users\baenu\Test> javac Q26.java
PS C:\Users\baenu\Test> java Q26
Enter a string: racecar
The string 'racecar' is a palindrome.
```

Question 27: String Literal and Object Creation

Problem Statement: Write a Java program that creates two string variables using string literals with the same content. Then, print whether both variables point to the same object.

Code Example:

String str1 = "hello";

String str2 = "hello";

Expected Output:

Both variables point to the same object: true

```
class Q27 {
    public static void main(String[] args) {
        String str1 = "hello";
        String str2 = "hello";
        System.out.println("Both variables point to the same object: " + (str1 == str2));
    }
}
```

```
PS C:\Users\baenu\Test> javac Q27.java
PS C:\Users\baenu\Test> java Q27
Both variables point to the same object: true
```


Question 28: String Creation with new Keyword

Problem Statement: Write a Java program that creates two string objects using the new keyword with the same content. Then, print whether both objects are the same using the == operator and the .equals() method.

Code Example:

```
String str1 = new String("hello");  
String str2 = new String("hello");
```

Expected Output:

Using == : false

Using .equals(): true

```
class Q28 {  
    public static void main(String[] args) {  
        String str1 = new String("hello");  
        String str2 = new String("hello");  
        System.out.println("Using == : " + (str1 == str2));  
        System.out.println("Using .equals(): " + str1.equals(str2));  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q28.java  
PS C:\Users\baenu\Test> java Q28  
Using == : false  
Using .equals(): true
```

Question 29: String Concatenation and Object Creation

Problem Statement: Write a Java program that concatenates two strings using the + operator. Print whether the concatenated string is a new object or a reference to an existing string object using the == operator.

Code Example:

```
String str1 = "hello";  
String str2 = "world";  
String str3 = str1 + str2;
```

Expected Output:

Is str3 pointing to the same object as str1? false

```
class Q29 {  
    public static void main(String[] args) {  
        String str1 = "hello";  
        String str2 = "world";  
        String str3 = str1 + str2;  
        System.out.println("Is str3 pointing to the same object as str1? " + (str3 == str1));  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q29.java  
PS C:\Users\baenu\Test> java Q29  
Is str3 pointing to the same object as str1? false
```

Question 30: String Pool with intern() Method

Problem Statement: Write a Java program that creates a string using the new keyword and then calls the intern() method. Print whether the interned string is pointing to the same object as the original string literal.

Code Example:

```
String str1 = new String("hello");  
String str2 = str1.intern();  
String str3 = "hello";
```

Expected Output:

Is str2 and str3 pointing to the same object? True

```
class Q30 {  
    public static void main(String[] args) {  
        String str1 = new String("hello");  
        String str2 = str1.intern();  
        String str3 = "hello";  
        System.out.println("Is str2 and str3 pointing to the same object? " + (str2 == str3));  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q30.java  
PS C:\Users\baenu\Test> java Q30  
Is str2 and str3 pointing to the same object? true
```

Question 31: Multiple String Literals with Same Content

Problem Statement: Write a Java program that declares three string literals with the same content and prints whether all three strings refer to the same object using the == operator.

Code Example:

```
String str1 = "java";  
String str2 = "java";  
String str3 = "java";
```

Expected Output:

All strings point to the same object: true

```
class Q31 {  
    public static void main(String[] args) {  
        String str1 = "java";  
        String str2 = "java";  
        String str3 = "java";  
        System.out.println("All strings point to the same object: " + (str1 == str2 && str2 == str3));  
    }  
}
```

```
PS C:\Users\baenu\Test> javac Q31.java  
PS C:\Users\baenu\Test> java Q31  
All strings point to the same object: true
```