

JAVA LAB 1

Q1. write a program called checkPassFail which prints "PASS" if the int variable "mark" is more than or equal to 50 , or prints "FAIL " otherwise. The program shall always print "DONE" before exiting ?

```
import java.util.Scanner;

public class checkPassFail {

    public static void main(String[] args) {

        Scanner marks = new Scanner(System.in);

        System.out.println("Enter marks");

        String userMarks = marks.nextLine();

        int i = Integer.parseInt(userMarks);

        if(i>=50){

            System.out.println("PASS");

        }

        else {

            System.out.println("FAIL");

        }

        System.out.println("DONE");

    }

}
```

output : Enter marks : 52 ,

PASS ,

DONE

Enter marks: 49

FAIL

DONE

Q2. write a program called check Odd Even which prints "Odd numbers" if the int variable "number" is odd , or "even number" otherwise. The program shall always print "bye" before existing.

```
import java.util.Scanner;

public class checkOddEven {

    public static void main(String[] args) {

        Scanner number = new Scanner(System.in);

        System.out.println("Enter number to check even and odd :");

        int i = number.nextInt();

        if(i%2!=0){

            System.out.println("Odd numbers");

        }

        else {

            System.out.println("Even numbers");

        }

        System.out.println("bye !");

    }

}
```

Output : Enter number to check even and odd : 12

Even numbers

bye !

Enter number to check even and odd : 13

Odd numbers

bye !

Q3. write a program called SumAverageRunningInt to produce the sum of 1,2,3,...,to 100 .Store 1 and 100 in variables lowerbound and upperbound ,so that we can change their values easily.Also compare and display the average.

```

public class SumAverageRunningInt {

    public static void main(String[] args) {

        int lowerbound = 1;

        int upperbound = 100;

        //calculate the sum of integers from lowerbound to upperbound

        int sum=0;

        for(int i=lowerbound;i<=upperbound;i++){

            sum =sum+i;

        }

        //calculate average

        double average = (double) sum/(upperbound-lowerbound+1);

        //display

        System.out.println("the sum of integers is :"+ lowerbound + "to" + upperbound +"is =" + " "
+ sum);

        System.out.println("The average is :"+average);

    }

}

```

Output : the sum of integers is :1to100is = 5050 The average is :50.5

Q.4 //write a program called HarmonicSum to compute the sum of a harmonic series , where n=50000

```

public class HarmonicSum {

    public static void main(String[] args) {

        int n=50000;

        double sum = 0.0;

        for(int i=1;i<=n;i++){

            sum = sum+1.0/i;

        }

    }

}

```

```

    }

    System.out.println("the sum of the harmonic series up to n = " + n + " is:" + " " +sum);

}

}

```

Output : the sum of the harmonic series up to n = 50000 is: 11.397003949278504

Q.5 write a program called Fibonacci to print the first 20 Fibonacci number $F(n)$, where $F(n)=F(n-1)+F(n-2)$ and $F(1)=F(2)=1$. also compare their average

```

public class Fibonacci {

    public static void main(String[] args) {

        int n = 20;

        long[] fibonacciNumbers = new long[n];

        //first two fibonacci numbers

        fibonacciNumbers[0] = 1;

        fibonacciNumbers[1] = 1;

        //generate the rest of the fibonacci numbers

        for(int i=2;i<n;i++){

            fibonacciNumbers[i]=fibonacciNumbers[i-1]+fibonacciNumbers[i-2];

        }

        //print the fibonacci numbers

        System.out.println("The first 20 fibonacci numbers are ");

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

            System.out.println(fibonacciNumbers[i]+ " ");

        }

        //calculate and print the average of the fibonacci numbers

        long sum=0;
    }
}

```

```

        for(int i=0;i<n;i++){
            sum+=fibonacciNumbers[i];
        }
        double average = (double) sum/n;
        System.out.println("\n The average of the first 20 fibonacci numbers is: "+average);
    }
}

```

Output : The first 20 fibonacci numbers are :

1 1 2 3 5 8 13 21 34 55 89 144 233 377 610 987 1597 2584 4181 6765

The average of the first 20 fibonacci numbers is: 885.5

Q.6 write a program called ExtraDigits to extract each digit from an int , in the reverse order, for example if the int is 15423,the output shallbe "3 2 4 5 1" with a space seperating the digits.

```

import java.util.Scanner;

public class ExtraDigits {

    public static void main(String[] args) {

        Scanner digit = new Scanner(System.in);

        System.out.println("Enter an integer :");

        int n = digit.nextInt();

        System.out.println("The digits in reverse order are :");

        while(n!=0){

            int digits = n%10;

            System.out.print(digits + " ");

            n=n/10;

        }

    }
}

```

Output : Enter an integer : 12345

 The digits in reverse order are : 5 4 3 2 1

Q7. write a program that prompts user for a positive integer. The program shall read the input as int and print the "reverse" of the input integer

```
import java.util.Scanner;
```

```
public class User {
```

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

```
        Scanner sc = new Scanner(System.in);
```

```
        System.out.println("Enter a positive integer :");
```

```
        int number = sc.nextInt();
```

```
        if(number<=0){
```

```
            System.out.println("Please enter a positive integer");
```

```
        }
```

```
    Else
```

```
    {
```

```
        int reverseNumber=0;
```

```
        //reverse the integer
```

```
        while(number!=0){
```

```
            int digit=number%10;
```

```
            reverseNumber=reverseNumber*10+digit;
```

```
            number=number/10;
```

```
        }
```

```
        System.out.println("the reverse of the entered integer is :"+ reverseNumber);
```

```
    }
```

```
}} }
```

Output : Enter a positive integer : 12345

the reverse of the entered integer is :54321

Q.8 Write a Program called TimeTable that prompts user for the size and prints the multiplication Table

```
import java.util.Scanner;

public class TimeTable {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.print("Enter the size of the multiplication table: ");

        int size = sc.nextInt();

        for (int i = 1; i <= size; i++) {

            for (int j = 1; j <= size; j++) {

                System.out.print(i * j + "\t");

            }

            System.out.println();

        }

        sc.close();

    }

}
```

Output : Enter the size of the multiplication table: 2

1	2
2	4

Q.9 #

```
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```

```
import java.util.Scanner;  
  
public class TriangularPatternA {  
  
    public static void main(String[] args) {  
  
        Scanner sc = new Scanner(System.in);  
  
        int n = sc.nextInt(); // The number of lines to print  
  
        for (int i = 1; i <= n; i++) {  
  
            for (int j = 1; j <= i; j++) {  
  
                System.out.print("# ");  
  
            }  
  
            System.out.println();  
  
        }  
  
    }  
  
}
```

```
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```

```
import java.util.Scanner;  
  
public class TriangularPatternB {  
  
    public static void main(String[] args) {  
  
        Scanner sc = new Scanner(System.in);  
  
        System.out.println("Enter number of line ");  
  
        int n = sc.nextInt();  
  
        for(int i=n;i>=1;i--){  
  
            for(int j=0; j<i; j++){  
  
                System.out.print(" # ");  
  
            }  
  
            System.out.println(" ");  
  
        }  
  
    }  
  
}
```



```
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```

```
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```

```
public class TriangularPatternC {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.println("Enter number of line");

        int n = sc.nextInt();

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

            // Print leading spaces

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

                System.out.print(" ");

            }

            // Print the # symbols

            for (int j = i; j < n; j++) {

                System.out.print("# ");

            }

            // Move to the next line

            System.out.println();

        }

    }

}
```

```
public class TriangularPatternD {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.println("Enter number of lines");

        int n = sc.nextInt();

        for (int i = 1; i <= n; i++) {

            // Print leading spaces

            for (int j = n; j > i; j--) {

                System.out.print(" ");

            }

            // Print the # symbols

            for (int j = 1; j <= i; j++) {

                System.out.print("# ");

            }

            // Move to the next line

            System.out.println();

        }

    }

}
```

Q10. Write a program called Dec2Hex that prompts user for a positive decimal number read as int and print its equivalent hexadecimal string

```
import java.util.Scanner;

public class Dec2Hex {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        // Prompt user for a positive decimal number

        System.out.print("Enter a positive decimal number: ");

        int decimalNumber = sc.nextInt();

        // Check if the input is positive

        if (decimalNumber < 0) {

            System.out.println("Please enter a positive number.");

        } else {

            // Convert decimal to hexadecimal

            String hexString = Integer.toHexString(decimalNumber).toUpperCase();

            // Print the equivalent hexadecimal string

            System.out.println("The hexadecimal equivalent is: " + hexString);

        }

        sc.close();

    }

}
```

Output :- Enter a positive decimal number: 255

 The hexadecimal equivalent is: FF

Q.11. Java Program to check whether the given integer is a multiple of both 5 and 7

```

import java.util.Scanner;

public class CheckMultiple {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        System.out.println("Enter an Integer : ");

        int number = sc.nextInt();

        if (number % 5 == 0 && number % 7 == 0) {

            System.out.println(number + " is a multiple of both 5 and 7.");

        } else {

            System.out.println(number + " is not a multiple of both 5 and 7.");

        }

        sc.close();

    }

}

```

Output :- Enter an Integer : 35

35 is a multiple of both 5 and 7.

Q.12. Java program to check whether the given integer is a prime number or not

```

import java.util.Scanner;

public class CheckPrime {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        // Prompt user for an integer

        System.out.print("Enter an integer: ");

        int number = scanner.nextInt();

        // Check if the number is prime

        boolean isPrime = true;
    }

}

```

```

if (number <= 1) {
    isPrime = false;
} else {
    for (int i = 2; i <= number / 2; i++) {
        if (number % i == 0) {
            isPrime = false;
            break;
        }
    }
}

// Print the result
if (isPrime) {
    System.out.println(number + " is a prime number.");
} else {
    System.out.println(number + " is not a prime number.");
}

scanner.close();
}
}

```

OutPut :- Enter an integer: 13

13 is a prime number.

Q.13. Java program to generate the prime numbers from 1 to N .

```

import java.util.Scanner;

public class PrimeNumber {

    public static void main(String[] args) {

```

```

Scanner sc = new Scanner(System.in);

// Prompt user for input
System.out.print("Enter a number (N): ");

int n = sc.nextInt();

System.out.println("Prime numbers between 1 and " + n + ":");

// Check prime numbers from 1 to n
for (int num = 2; num <= n; num++) {

    boolean isPrime = true;

    // Check if num is a prime number
    for (int i = 2; i <= num / 2; i++) {

        if (num % i == 0) {

            isPrime = false;

            break;

        }

    }

    // Print num if it is prime
    if (isPrime) {

        System.out.print(num + " ");

    }

}

sc.close();

}

```

Output :- Enter a number (N): 100 Prime numbers between 1 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

Q14. Java program to find the factorial of a number using recursion

```
import java.util.Scanner;

public class Factorial {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        // Prompt user for input

        System.out.print("Enter a non-negative integer: ");

        int n = scanner.nextInt();

        // Calculate factorial using recursion

        long factorial = calculateFactorial(n);

        // Print the result

        System.out.println("Factorial of " + n + " is: " + factorial);

        scanner.close();

    }

    // Recursive method to calculate factorial

    public static long calculateFactorial(int n) {

        // Base case: factorial of 0 is 1

        if (n == 0) {

            return 1;

        }

        // Recursive case: n * factorial(n-1)

        return n * calculateFactorial(n - 1);

    }

}
```

Output :- Enter a non-negative integer: 5 Factorial of 5 is: 120

Q15. Java program to implement Binary Search

```
import java.util.Scanner;

public class BinarySearch {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        // Prompt user for input

        System.out.print("Enter the number of elements in the array: ");

        int n = sc.nextInt();

        int[] arr = new int[n];

        System.out.println("Enter " + n + " sorted integers:");

        // Read the sorted array elements

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

            arr[i] = sc.nextInt();

        }

        // Prompt user for the element to search

        System.out.print("Enter the element to search: ");

        int target = sc.nextInt();

        // Perform binary search

        int index = binarySearch(arr, target);

        // Print the result

        if (index != -1) {

            System.out.println(target + " found at index " + index);

        } else {

            System.out.println(target + " not found in the array.");

        }

        sc.close(); }

}
```

```
// Binary search method

public static int binarySearch(int[] arr, int target) {

    int left = 0;

    int right = arr.length - 1;

    while (left <= right) {

        int mid = left + (right - left) / 2;

        // Check if target is present at mid

        if (arr[mid] == target) {

            return mid;

        }

        // If target is greater, ignore left half

        if (arr[mid] < target) {

            left = mid + 1;

        }

        // If target is smaller, ignore right half

        else {

            right = mid - 1;

        }

    }

    // Element is not present in array

    return -1;

}

}
```

Output :- Enter the number of elements in the array: 4

Enter 4 sorted integers:10 11 12 13

Enter the element to search:11

11 found at index 1

Q16. Java program to find the number of odd numbers in an array

```
import java.util.Scanner;

public class OddNumber {

    public static void main(String[] args) {

        Scanner sc = new Scanner(System.in);

        // Prompt user for input

        System.out.print("Enter the number of elements in the array: ");

        int n = sc.nextInt();

        int[] arr = new int[n];

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

        // Read array elements

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

            arr[i] = sc.nextInt();

        }

        // Count odd numbers

        int oddCount = countOddNumbers(arr);

        // Print the result

        System.out.println("Number of odd numbers in the array: " + oddCount);

        sc.close();

    }

    // Method to count odd numbers in an array

    public static int countOddNumbers(int[] arr) {

        int count = 0;

        for (int num : arr) {

            if (num % 2 != 0) { // Check if number is odd

                count++;

            }

        }

    }

}
```

```

    }

    return count;

}

}

```

Output :- Enter the number of elements in the array: 4

Enter 4 integers:10 12 14 15

Number of odd numbers in the array: 1

Q17. Java program to check whether a string is a palindrome or not

```

public class PalindromeChecker {

    public static void main(String[] args) {

        String str = "madam"; // You can change this string to test other inputs

        boolean isPalindrome = checkPalindrome(str);

        if (isPalindrome) {

            System.out.println(str + " is a palindrome.");

        } else {

            System.out.println(str + " is not a palindrome.");

        }

    }

    public static boolean checkPalindrome(String str) {

        int length = str.length();

        for (int i = 0; i < length / 2; i++) {

            if (str.charAt(i) != str.charAt(length - i - 1)) {

                return false;

            }

        }

        return true; } }

```

Output :- madam is a palindrome.

Q.18. Java Program to implement matrix multiplication .

```
public class MatrixMultiplication {

    public static void main(String[] args) {

        // Define two matrices

        int[][] matrixA = {

            {1, 2, 3},

            {4, 5, 6}

        };

        int[][] matrixB = {

            {7, 8},

            {9, 10},

            {11, 12}

        };

        // Check if multiplication is possible

        if (matrixA[0].length != matrixB.length) {

            System.out.println("Matrix multiplication is not possible.");

            return;

        }

        // Perform matrix multiplication

        int[][] result = multiplyMatrices(matrixA, matrixB);

        // Print the result

        printMatrix(result);

    }

    public static int[][] multiplyMatrices(int[][] matrixA, int[][] matrixB) {

        int rowsA = matrixA.length;

        int colsA = matrixA[0].length;

        int colsB = matrixB[0].length;
```

```

int[][] result = new int[rowsA][colsB];

for (int i = 0; i < rowsA; i++) {
    for (int j = 0; j < colsB; j++) {
        for (int k = 0; k < colsA; k++) {
            result[i][j] += matrixA[i][k] * matrixB[k][j];
        }
    }
}

return result;
}

public static void printMatrix(int[][] matrix) {
    for (int[] row : matrix) {
        for (int element : row) {
            System.out.print(element + " ");
        }
        System.out.println();
    }
}
}

```

Output :- 58 64

 139 154

Q.19. Java program to check Leap year

```
import java.util.Scanner;

public class LeapYear {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter a year: ");

        int year = scanner.nextInt();

        if (isLeapYear(year)) {

            System.out.println(year + " is a leap year.");

        } else {

            System.out.println(year + " is not a leap year.");

        }

        scanner.close();

    }

    public static boolean isLeapYear(int year) {

        // Leap year is divisible by 4

        // but not divisible by 100 unless it is also divisible by 400

        if (year % 4 == 0) {

            if (year % 100 == 0) {

                if (year % 400 == 0) {

                    return true;

                } else {

                    return false;

                }

            } else {

                return true;

            }

        }

    }

}
```

```

    } else {
        return false;
    }
}
}

```

Output :- Enter a year: 2024

2024 is a leap year.

Q.20. Java program to find the largest and smallest numbers from a list of numbers.

```

import java.util.Scanner;

public class LargestSmallestFind {

    public static void main(String[] args) {

        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter the number of elements: ");

        int n = scanner.nextInt();

        int[] numbers = new int[n];

        System.out.println("Enter the numbers:");

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

            numbers[i] = scanner.nextInt();

        }

        int largest = findLargest(numbers);

        int smallest = findSmallest(numbers);

        System.out.println("Largest number: " + largest);

        System.out.println("Smallest number: " + smallest);

        scanner.close();

    }

    public static int findLargest(int[] numbers) {

```

```
    int largest = numbers[0];
    for (int number : numbers) {
        if (number > largest) {
            largest = number;
        }
    }
    return largest;
}

public static int findSmallest(int[] numbers) {
    int smallest = numbers[0];
    for (int number : numbers) {
        if (number < smallest) {
            smallest = number;
        }
    }
    return smallest;
}
}
```

Output :- Enter the number of elements: 5
Enter the numbers: 12 -1 12 15 20
Largest number: 20
Smallest number: -1