**1.  a) Write a Java program that prompts the user to enter an integer, reads the input, and displays the entered integer on the console.**

import java.util.Scanner;

public class Main

{

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

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

int integer = scanner.nextInt();

System.out.println("Entered Integer: " + integer);

}

}

**b) Develop a Java program that reads two floating-point numbers from the user, calculates their average, and displays the result on the console with two decimal places.**

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

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

double firstNumber = scanner.nextDouble();

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

double secondNumber = scanner.nextDouble();

double average = (firstNumber + secondNumber) / 2;

System.out.printf("The average is: %.2f%n", average);

}

}

**2. Implement a Java program that simulates a basic calculator with functionalities to perform addition, subtraction, multiplication, and division.**

**The program should prompt the user to enter two numbers and an operator (+, -, , /), perform the corresponding operation, and display the result.**

**Ensure to handle division by zero and invalid operator inputs.**

import java.util.Scanner;

public class Main{

public static void main(String[] args) {

Scanner scanner = new Scanner(System.in);

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

double firstNumber = scanner.nextDouble();

System.out.print("Enter the operator (+, -, \*, /): ");

char operator = scanner.next().charAt(0);

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

double secondNumber = scanner.nextDouble();

double result = 0;

switch (operator) {

case '+':

result = firstNumber + secondNumber;

System.out.print("Addition of numbers: "+result);

break;

case '-':

result = firstNumber - secondNumber;

System.out.print("Subtraction of numbers: "+result);

break;

case '\*':

result = firstNumber \* secondNumber;

System.out.print("Multiplication of numbers: "+result);

break;

case '/':

result = firstNumber / secondNumber;

System.out.print("Division of numbers: "+result);

break;

default:

System.out.println("Invalid operator.");

break;

}

}

}

**3.   Write an Java program to determine if a number n is happy.**

**A happy number is a number defined by the following process:**

**Starting with any positive integer, replace the number by the sum of the squares of its digits. Repeat the process until the number equals 1 (where it will stay), or it loops endlessly in a cycle which does not include 1.Those numbers for which this process ends in 1 are happy.**

**Print true *if* n *is a happy number, and* false *if not***

import java.util.HashSet;

import java.util.Set;

import java.util.Scanner;

public class Main {

public static void main(String[] args) {

Scanner scan = new Scanner(System.in);

System.out.print("Enter number: ");

int n = scan.nextInt();

System.out.println(isHappy(n));

}

public static boolean isHappy(int n) {

Set<Integer> seen = new HashSet<>();

while (n != 1 && !seen.contains(n)) {

seen.add(n);

n = getNextHappyNumber(n);

}

return n == 1;

}

private static int getNextHappyNumber(int n) {

int sum = 0;

while (n > 0) {

int digit = n % 10;

sum += digit \* digit;

n /= 10;

}

return sum;

}

}