

AP Tutorials

Java Programming classes under Aryan Singh

Week 2 Assignment

- 1) Find if a number is strong or not Java
- 2) How to find if a year is leap year or not in Java
- 3) Solve a quadratic equation in Java

1. Check if a Number is Strong in Java

A **strong number** is a number whose sum of the factorials of its digits equals the number itself. For example, 145 is a strong number because

$$1! + 4! + 5! = 145$$

Here's how you can implement this in Java:

```
import java.util.Scanner;

public class StrongNumber {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter a number: ");
        int num = scanner.nextInt();
        int originalNum = num;
        int sum = 0;

        while (num > 0) {
            int digit = num % 10;
            sum += factorial(digit);
            num /= 10;
        }

        if (sum == originalNum) {
            System.out.println(originalNum + " is a strong number.");
        } else {
            System.out.println(originalNum + " is not a strong number.");
        }
    }

    public static int factorial(int n) {
        if (n == 0) return 1;
        int fact = 1;
        for (int i = 1; i <= n; i++) {
```

```

        fact *= i;
    }
    return fact;
}
}

```

This code takes an integer input, calculates the sum of the factorials of its digits, and checks if this sum equals the original number.

2. Determine if a Year is a Leap Year in Java

A **leap year** occurs every four years, except for years that are divisible by 100 but not by 400. Here's how to check if a year is a leap year in Java:

```

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 ((year % 4 == 0 && year % 100 != 0) || (year % 400 == 0)) {
            System.out.println(year + " is a leap year.");
        } else {
            System.out.println(year + " is not a leap year.");
        }
    }
}

```

This program prompts the user to enter a year and checks the conditions for determining whether it is a leap year.

3. Solve a Quadratic Equation in Java

To solve the quadratic equation

$$ax^2 + bx + c = 0$$

, you can use the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Here's how to implement this in Java:

```

import java.util.Scanner;

```

```

public class QuadraticEquation {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter coefficients a, b and c: ");
        double a = scanner.nextDouble();
        double b = scanner.nextDouble();
        double c = scanner.nextDouble();

        double discriminant = b * b - 4 * a * c;

        if (discriminant > 0) {
            double root1 = (-b + Math.sqrt(discriminant)) / (2 * a);
            double root2 = (-b - Math.sqrt(discriminant)) / (2 * a);
            System.out.println("Roots are real and different.");
            System.out.println("Root 1: " + root1);
            System.out.println("Root 2: " + root2);
        } else if (discriminant == 0) {
            double root = -b / (2 * a);
            System.out.println("Roots are real and the same.");
            System.out.println("Root: " + root);
        } else {
            System.out.println("Roots are complex and different.");
            double realPart = -b / (2 * a);
            double imaginaryPart = Math.sqrt(-discriminant) / (2 * a);
            System.out.println("Root 1: " + realPart + " + " + imaginaryPart + "i");
            System.out.println("Root 2: " + realPart + " - " + imaginaryPart + "i");
        }
    }
}

```