CSE1007 - Java Programming

Lab Assessment 3

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LAB - L5 + L6
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Question/Task

3. Write a java program, by creating a base class number with a method calculate() to get the sum of the given digits. Derive the base class to a subclass quadratic, to find the real and imaginary solutions for the given quadratic equation by overriding the method calculate(). Again derive the base class number , to another subclass called sos , to find the sum of square of the given number by overriding the method calculate().

Observation: The reason variables are inputted inside the overriden functions (not in main function) is because use of passing the required variables as parameters would mean that the function will be overloaded instead of being overriden.

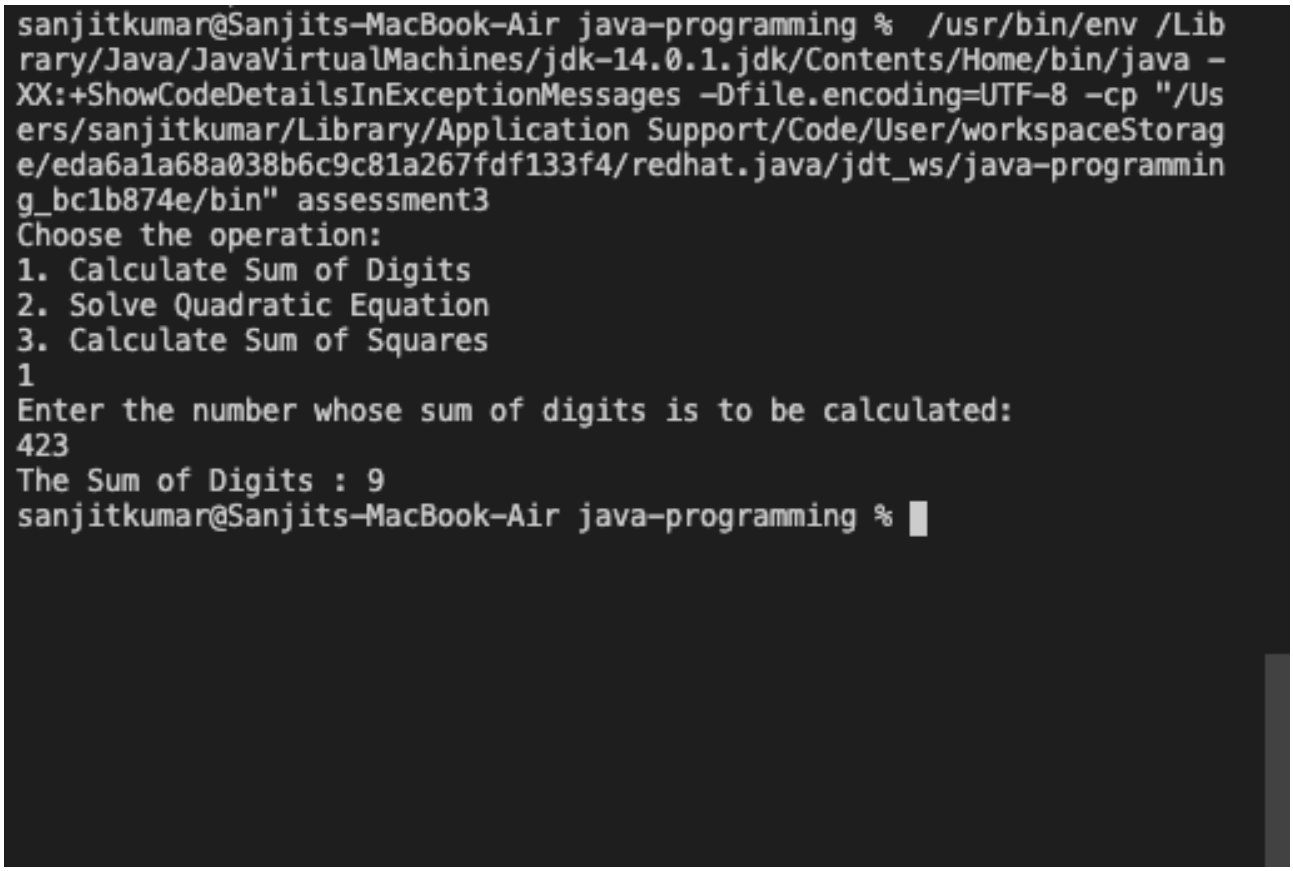
```
import java.util.Scanner;

class number {
    void calculate() {
        System.out.println("Enter the number whose sum of digits is to
be calculated:");
        Scanner s = new Scanner(System.in);
        int num = s.nextInt();

        int sum = 0;

        while (num != 0) {
            sum = sum + num % 10;
            num = num / 10;
        }

        System.out.println("The Sum of Digits : "+sum);
    }
}

class quadratic extends number {
    void calculate() {
        int a, b, c;
        System.out.println("Enter the values of a, b and c in the
standard quadratic equation ax^2 + bx + x:");
        Scanner s = new Scanner(System.in);
```

```
        a = s.nextInt();
        b = s.nextInt();
        c = s.nextInt();

        double root1, root2, imaginary, discriminant;
        discriminant = (b * b) - (4 * a *c);

        if(discriminant > 0)
        {
            root1 = (-b + Math.sqrt(discriminant) / (2 * a));
            root2 = (-b - Math.sqrt(discriminant) / (2 * a));
            System.out.println("\n Two Distinct Real Roots Exists: root1
= " + root1 + " and root2 = " + root2);
        }
        else if(discriminant == 0)
        {
            root1 = root2 = -b / (2 * a);
            System.out.println("\n Two Equal and Real Roots Exists:
root1 = " + root1 + " and root2 = " + root2);
        }
        else if(discriminant < 0)
        {
            root1 = root2 = -b / (2 * a);
            imaginary = Math.sqrt(-discriminant) / (2 * a);
            System.out.println("\n Two Distinct Complex Roots Exists:
root1 = " + root1 +
                        " + " + imaginary + " and root2 = " + root2 +" -
" +imaginary);
        }

    }
}

class sos extends number{
    void calculate(){
        System.out.println("Enter A number for calculating the sum of
squares of all natural numbers till that number:");
        Scanner s = new Scanner(System.in);
        int num = s.nextInt();


        int sum_of_sq=0;
        for (int i=0;i<num;i++){
            sum_of_sq+=Math.pow(i, 2);
        }
        System.out.println("The sum of squares till given number are :
"+sum_of_sq);
    }
}

public class assessment3 {
    public static void main(String[] args) {
        System.out.println("Choose the operation:\n1. Calculate Sum of
Digits\n2. Solve Quadratic Equation\n3. Calculate Sum of Squares");
        Scanner s = new Scanner(System.in);
        int ch = s.nextInt();
```

```
        switch(ch){
            case 1:
                number obj1 = new number();
                obj1.calculate();
                break;
            case 2:
                quadratic obj2 = new quadratic();
                obj2.calculate();
                break;
            case 3:
                sos obj3 = new sos();
                obj3.calculate();
                break;
        }
    }
}
```

Output

Sum of Digits



Quadratic Solution - For Cases of Real and Unequal, Real and Equal and Imaginary Roots

```
sanjitkumar@Sanjits-MacBook-Air java-programming %  cd "/Users/sanjitkumar/Documents/VIT_DOC/vit_semester_6/C2 - Java Programming/java-programming
" ; /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-14.0.1.jdk/Contents/Home/bin/java -XX:+ShowCodeDetailsInExceptionMessages -Dfile.encoding=U
TF-8 -cp "/Users/sanjitkumar/Library/Application Support/Code/User/workspaceStorage/eda6a1a68a038b6c9c81a267fdf133f4/redhat.java/jdt_ws/java-progr
amming_bc1b874e/bin" assessment3
Choose the operation:
1. Calculate Sum of Digits
2. Solve Quadratic Equation
3. Calculate Sum of Squares
2
Enter the values of a, b and c in the standard quadratic equation ax^2 + bx + x:
1
2
1

 Two Equal and Real Roots Exists: root1 = -1.0 and root2 = -1.0
sanjitkumar@Sanjits-MacBook-Air java-programming %  cd "/Users/sanjitkumar/Documents/VIT_DOC/vit_semester_6/C2 - Java Programming/java-programming
" ; /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-14.0.1.jdk/Contents/Home/bin/java -XX:+ShowCodeDetailsInExceptionMessages -Dfile.encoding=U
TF-8 -cp "/Users/sanjitkumar/Library/Application Support/Code/User/workspaceStorage/eda6a1a68a038b6c9c81a267fdf133f4/redhat.java/jdt_ws/java-progr
amming_bc1b874e/bin" assessment3
Choose the operation:
1. Calculate Sum of Digits
2. Solve Quadratic Equation
3. Calculate Sum of Squares
2
Enter the values of a, b and c in the standard quadratic equation ax^2 + bx + x:
1
2
4

 Two Distinct Complex Roots Exists: root1 = -1.0 + 1.7320508075688772 and root2 = -1.0 - 1.7320508075688772
sanjitkumar@Sanjits-MacBook-Air java-programming %  cd "/Users/sanjitkumar/Documents/VIT_DOC/vit_semester_6/C2 - Java Programming/java-programming
" ; /usr/bin/env /Library/Java/JavaVirtualMachines/jdk-14.0.1.jdk/Contents/Home/bin/java -XX:+ShowCodeDetailsInExceptionMessages -Dfile.encoding=U
TF-8 -cp "/Users/sanjitkumar/Library/Application Support/Code/User/workspaceStorage/eda6a1a68a038b6c9c81a267fdf133f4/redhat.java/jdt_ws/java-progr
amming_bc1b874e/bin" assessment3
Choose the operation:
1. Calculate Sum of Digits
2. Solve Quadratic Equation
3. Calculate Sum of Squares
2
Enter the values of a, b and c in the standard quadratic equation ax^2 + bx + x:
1
4
2

 Two Distinct Real Roots Exists: root1 = -2.585786437626905 and root2 = -5.414213562373095
sanjitkumar@Sanjits-MacBook-Air java-programming %
```

Sum of Squares

```
sanjitkumar@Sanjits-MacBook-Air java-programming %  /usr/bin/env /Library/Java/JavaVirtualMach
ines/jdk-14.0.1.jdk/Contents/Home/bin/java -XX:+ShowCodeDetailsInExceptionMessages -Dfile.enco
ding=UTF-8 -cp "/Users/sanjitkumar/Library/Application Support/Code/User/workspaceStorage/eda6
a1a68a038b6c9c81a267fdf133f4/redhat.java/jdt_ws/java-programming_bc1b874e/bin" assessment3
Choose the operation:
1. Calculate Sum of Digits
2. Solve Quadratic Equation
3. Calculate Sum of Squares
3
Enter A number for calculating the sum of squares of all natural numbers till that number:
6
The sum of squares till given number are : 55
sanjitkumar@Sanjits-MacBook-Air java-programming %
```