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Course: OOP in java

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Assignment: Lab03

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### Exercise 1

#### Source Codes

```
import java.util.Scanner;
class Equation {
    double a, b, c;
    Equation(double a, double b, double c) {
        this.a = a;
        this.b = b;
        this.c = c;
    }
    void quadraticEquation() {
        double x1, x2, x;
        double delta = Math.pow(b, 2) - (4 * a * c);
        if (delta > 0) {
            x1 = (-b + Math.sqrt(delta)) / (2 * a);
            x2 = (-b - Math.sqrt(delta)) / (2 * a);
            System.out.println("X1 = " + \times1 + ", X2 = " + \times2);
        } else if (delta == 0) {
            x = (-b) / (2 * a);
            System.out.println("X1 = X2 = " + x);
            System.out.println("Equation roots are complex!");
    }
public class ex1 {
    public static void main(String[] args) {
```

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

double a, b, c;

System.out.println("Program for calculating roots of quadratic equation");
System.out.println("ax^2 + bx + c = 0");
System.out.print("Input value of a: ");
a = scanner.nextDouble();
System.out.print("Input value of b: ");
b = scanner.nextDouble();
System.out.print("Input value of c: ");
c = scanner.nextDouble();

Equation equation = new Equation(a, b, c);
equation.quadraticEquation();

scanner.close();
}
```

### Output

```
Program for calculating roots of quadratic equation

ax^2 + bx + c = 0

Input value of a: 1

Input value of b: -2

Input value of c: 1

X1 = X2 = 1.0
```

# Exercise 2

#### Source Code

```
import java.util.Scanner;

class Process {
    int num;
    int value[];

    Process(int num, int value[]) {
        this.num = num;
        this.value = value;
    }
}
```

```
int findMin() {
        int min = value[0];
        for (int i = 1; i < num; i++) {
            if (value[i] < min) {</pre>
                min = value[i];
            }
        return min;
    }
    int findMax() {
        int max = value[0];
        for (int i = 1; i < num; i++) {
            if (value[i] > max) {
                max = value[i];
        }
        return max;
    }
    int findSum() {
        int Sum = value[0];
        for (int i = 1; i < num; i++) {
            Sum += value[i];
        return Sum;
    }
    int findAvg() {
        return findSum() / num;
}
public class ex2 {
    public static void main(String[] args) throws Exception {
        try (Scanner sc = new Scanner(System.in)) {
            System.out.println("How many number to be input? ");
            System.out.println("Number of input: ");
            int num = sc.nextInt();
            int value[] = new int[num];
            for (int i = 0; i < num; i++) {
                System.out.print("Value #" + (i + 1) + ": ");
                value[i] = sc.nextInt();
            Process p = new Process(num, value);
            System.out.println("Min: " + p.findMin());
            System.out.println("Max: " + p.findMax());
            System.out.println("Average: " + p.findAvg());
            System.out.println("Sum: " + p.findSum());
```

```
}
}
}
```

### Output:

```
How many number to be input?

Number of input: 5

Value #1: 2

Value #2: -4

Value #3: 3

Value #4: 7

Value #5: 8

Min: -4

Max: 8

Average: 3

Sum: 16
```

# Exercise 3

#### Source Code:

```
import java.util.Scanner;
class Setting {
    void Menu() {
        System.out.println("Phone Setting: ");
        System.out.printf("%-15s %-3s\n", "1. General", ">");
        System.out.printf("%-15s %-3s\n", "2. Wi-Fi", ">");
        System.out.printf("%-15s %-3s\n", "3. Bluetooth", ">");
        System.out.printf("%-15s %-3s\n", "4. Mobile Data", ">");
        System.out.printf("%-15s %-3s\n", "5. Hotspot", ">");
        System.out.printf("%-15s %-3s\n", "6. Notification", ">");
        System.out.printf("%-15s", "0. Quit");
    }
    void general() {
        System.out.println("\nGeneral:");
        System.out.printf("%-15s %s\n", "1. About", ">");
System.out.printf("%-15s %s\n", "2. Software update", ">");
        System.out.printf("%-15s %s\n", "3. Storage", ">");
        System.out.printf("%-15s\n", "0. Back");
    }
    void generalToAbout() {
```

```
System.out.println("\nGeneral > About:");
        System.out.printf("%-15s %s\n", "Name", "iPhone");
        System.out.printf("%-15s %s\n", "Model", "IXs");
        System.out.printf("%-15s %s\n", "Version", "18.5");
        System.out.printf("%-15s\n", "0. Back");
   }
   void generalToSU() {
        System.out.println("\n=======");
        System.out.println("Software is up to date");
        System.out.println("========");
        System.out.printf("%-15s\n", "0. Back");
   }
   void wifi() {
        System.out.println("\nWi-Fi:");
        System.out.printf("%-15s %s\n", "Status", "On");
        System.out.printf("%-15s %s\n", "Network", "I-Coffee");
        System.out.printf("%-15s %s\n", "1. Other networks", ">");
       System.out.printf("%-15s\n", "0. Back");
   }
   void wifiToON() {
        System.out.println("\nWi-Fi > Other networks:");
        System.out.printf("%-15s %s\n", "Bayon coffee", "*****");
       System.out.printf("%-15s %s\n", "Angkor coffee", "**");
System.out.printf("%-15s %s\n", "Brown coffee", "****");
        System.out.printf("%-15s %s\n", "Koi", "*");
        System.out.printf("%-15s\n", "0. Back");
   }
   void otherSetting(String title) {
        System.out.println(title);
        System.out.println("\n========");
        System.out.println("The Feture is not available");
        System.out.println("========");
        System.out.printf("%-15s\n", "0. Back");
   }
}
public class ex3 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Setting phone setting = new Setting();
        int choice;
        do {
            int generalChoice;
```

```
int wifiChoice;
            System.out.println();
            phone_setting.Menu();
            System.out.print("\nChoice: ");
            choice = scanner.nextInt();
            switch (choice) {
                case 1:
                    do {
                        int choiceInGeneral;
                        phone_setting.general();
                        System.out.print("Choice: ");
                        generalChoice = scanner.nextInt();
                        switch (generalChoice) {
                             case 1:
                                do {
                                     phone_setting.generalToAbout();
                                     System.out.print("\nChoice: ");
                                     choiceInGeneral = scanner.nextInt();
                                 } while (choiceInGeneral != 0);
                                 break;
                             case 2:
                                 do {
                                     System.out.println("\nGeneral > Software
Update:");
                                     phone_setting.generalToSU();
                                     System.out.print("\nChoice: ");
                                     choiceInGeneral = scanner.nextInt();
                                 } while (choiceInGeneral != 0);
                                 break;
                             case 3:
                                 do {
                                     System.out.println("\nGeneral > Storage:");
                                     phone_setting.generalToSU();
                                     System.out.print("\nChoice: ");
                                     choiceInGeneral = scanner.nextInt();
                                 } while (choiceInGeneral != ∅);
                                 break;
                        }
                    } while (generalChoice != ∅);
                    break;
                case 2:
                    do {
                        int choiceInWifi;
                        phone_setting.wifi();
                        System.out.print("\nChoice: ");
```

```
wifiChoice = scanner.nextInt();
                    switch (wifiChoice) {
                         case 1:
                             do {
                                 phone_setting.wifiToON();
                                 System.out.print("\nChoice: ");
                                 choiceInWifi = scanner.nextInt();
                             } while (choiceInWifi != 0);
                             break;
                    }
                } while (wifiChoice != ∅);
                break;
            case 3:
                int opt;
                do {
                    phone_setting.otherSetting("\nBluetooth");
                    System.out.print("Choice: ");
                    opt = scanner.nextInt();
                } while (opt != ∅);
                break;
            case 4:
                do {
                    phone_setting.otherSetting("\nMobile Data");
                    System.out.print("\nChoice: ");
                    opt = scanner.nextInt();
                } while (opt != ∅);
                break;
            case 5:
                do {
                    phone_setting.otherSetting("\nHotspot");
                    System.out.print("Choice: ");
                    opt = scanner.nextInt();
                } while (opt != ∅);
                break;
            case 6:
                do {
                     phone_setting.otherSetting("\nNotification");
                    System.out.print("Choice: ");
                    opt = scanner.nextInt();
                } while (opt != ∅);
                break;
    } while (choice != ∅);
    System.out.println("\nThank you for using our Program ><");</pre>
    scanner.close();
}
```

```
}
```

### Output:

```
Choice 1
Phone Setting:

    General

2. Wi-Fi
3. Bluetooth >
4. Mobile Data >
5. Hotspot >
6. Notification >
Quit
Choice: 1
General:

    About

2. Software update >
3. Storage >
Back
Choice: 1
General > About:
        iPhone
Name
Model
            IXs
Version
            18.5
Back
Choice: 0
General:
1. About
2. Software update >
3. Storage >
Back
Choice: 2
General > Software Update:
Software is up to date
_____
Back
Choice: 0
General:

    About

2. Software update >
```

```
3. Storage >
Back
Choice: 3
General > Storage:
Software is up to date
_____
Back
choice 2
Phone Setting:
1. General >
2. Wi-Fi
3. Bluetooth >
4. Mobile Data >
Hotspot
6. Notification >
Quit
Choice: 2
Wi-Fi:
Status
            On
Network
            I-Coffee
1. Other networks >
Back
Choice: 1
Wi-Fi > Other networks:
Bayon coffee *****
Angkor coffee **
            ****
Brown coffee
Koi
Back
choice 3
Phone Setting:

    General

2. Wi-Fi
Bluetooth
4. Mobile Data >
Hotspot
6. Notification >
0. Quit
Choice: 3
Bluetooth
The Feture is not available
```

```
_____
Back
choice 4
Phone Setting:

    General

2. Wi-Fi
3. Bluetooth >
4. Mobile Data >
Hotspot
6. Notification >
0. Quit
Choice: 4
Mobile Data
_____
The Feture is not available
_____
Back
choice 5
Phone Setting:
1. General >
2. Wi-Fi
3. Bluetooth >
4. Mobile Data >
Hotspot
6. Notification >
0. Quit
Choice: 5
Hotspot
The Feture is not available
_____
Back
choice 6
Phone Setting:

    General

2. Wi-Fi
3. Bluetooth >
4. Mobile Data >
Hotspot
6. Notification >
0. Quit
Choice: 6
Notification
```

# Exercise 4

### Source Code:

```
import java.util.Scanner;
class Student {
    String id;
    String name;
    int age;
    Student(String id, String name, int age) {
        this.id = id;
        this.name = name;
        this.age = age;
    }
}
public class ex4 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Student[] student = new Student[100];
        String id, name;
```

```
int age;
       String answer;
       int count = 0;
       for (int i = 0; i < student.length; i++) {
          System.out.println("Student #" + (i + 1) + ":");
          System.out.print("ID: ");
          id = scanner.nextLine();
          System.out.print("Name: ");
          name = scanner.nextLine();
          System.out.print("Age: ");
          age = scanner.nextInt();
          student[i] = new Student(id, name, age);
          count++;
          scanner.nextLine();
          System.out.print("Do you want to add more (y/n)?: ");
          answer = scanner.nextLine();
          if (answer.equalsIgnoreCase("n")) {
              break;
          }
      }
       System.out.println("========");
       System.out.printf("| %-5s | %-10s | %-15s | %-4s |\n", "No", "ID", "Name",
"Age");
       System.out.println("========");
       for (int j = 0; j < count; j++) {
          System.out.printf("| %-5d | %-10s | %-15s | %-4d |\n", (j + 1),
student[j].id, student[j].name,
                 student[j].age);
       }
       System.out.println("=======");
       scanner.close();
   }
}
```

### Output:

```
Student #1:
ID: 0001
Name: Rith
Age: 18
```

```
Do you want to add more (y/n)?: y
Student #2:
ID: 0002
Name: Rithyy
Age: 19
Do you want to add more (y/n)?: n
_____
              | Age |
No ID Name
_____
   1
                  18
   | 0002 | Rithyy
                  19
_____
```

# Exercise 5

#### Source Code:

```
import java.util.Scanner;
class Math {
    static double add(double a, double b) {
       return a + b;
    }
    static double subtract(double a, double b) {
        return a - b;
    }
    static double multiply(double a, double b) {
        return a * b;
    static double divide(double a, double b) {
        return a / b;
    static double min(double a, double b) {
        if (a > b) {
            return b;
        } else {
            return a;
        }
    }
    static double max(double a, double b) {
```

```
if (a > b) {
            return a;
        } else {
            return b;
        }
    }
}
public class ex5 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        double x, y;
        System.out.print("Enter a number: ");
        x = scanner.nextDouble();
        System.out.print("Enter other number: ");
        y = scanner.nextDouble();
        System.out.println("\nResult: \n");
        System.out.println(x + " + " + y + " = " + Math.add(x, y));
        System.out.println(x + " - " + y + " = " + Math.subtract(x, y));
        System.out.println(x + " x " + y + " = " + Math.multiply(x, y));
        System.out.println(x + " / " + y + " = " + Math.divide(x, y));
        System.out.println("Min: " + Math.min(x, y));
        System.out.println("Max: " + Math.max(x, y));
        scanner.close();
    }
}
```

### Output:

```
Enter a number: 10
Enter other number: 8

Result:

10.0 + 8.0 = 18.0
10.0 - 8.0 = 2.0
10.0 x 8.0 = 80.0
10.0 / 8.0 = 1.25
Min: 8.0
```

```
Max: 10.0

if number / 0:

Enter a number: 10
Enter other number: 0

Result:

10.0 + 0.0 = 10.0
10.0 - 0.0 = 10.0
10.0 x 0.0 = 0.0
10.0 / 0.0 = Infinity
Min: 0.0
Max: 10.0
```

# Exercise 6

#### Source Codes

```
import java.util.Scanner;
class MyMath2 {
   static int factorial(int n) {
        if (n == 1)
            return 1;
        return n * factorial(n - 1);
    }
    static double rectangleSurface(double width, double height) {
        return width * height;
    }
    static double circleSurface(double radius) {
        return 3.14 * radius * radius;
    static int max(int a, int b, int c, int d, int e) {
        if (a > b && a > c && a > d && a > e) {
            return a;
        } else if (b > a && b > c && b > d && b > e) {
            return b;
        } else if (c > a && c > b && c > d && c > e) {
            return c;
        } else if (d > a && d > b && d > c && d > e) {
            return d;
        } else {
            return e;
```

```
}
    static int min(int a, int b, int c, int d, int e) {
        if (a < b && a < c && a < d && a < e) {
            return a;
        } else if (b < a && b < c && b < d && b < e) {</pre>
            return b;
        } else if (c < a && c < b && c < d && c < e) {
            return c;
        } else if (d < a && d < b && d < c && d < e) {</pre>
            return d;
        } else {
            return e;
        }
    }
}
public class ex6 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        int n;
        double width, height;
        double radius;
        int a, b, c, d, e;
        System.out.print("Enter a number to define its Factorial: ");
        n = scanner.nextInt();
        System.out.println(n + "! = " + MyMath2.factorial(n));
        System.out.println("\n\t=== Define Rectangle Surface ===");
        System.out.print("Enter a Width: ");
        width = scanner.nextDouble();
        System.out.print("Enter a Height: ");
        height = scanner.nextDouble();
        System.out.println("Surface of Rectangle = " +
MyMath2.rectangleSurface(width, height) + " m^2");
        System.out.println("\n\t=== Define Circle Surface ===");
        System.out.print("Enter a Radius: ");
        radius = scanner.nextDouble();
        System.out.println("Surface of Circle = " + MyMath2.circleSurface(radius)
+ " m^2");
```

```
System.out.println("\n\t=== Define Max and Min value ===");
        System.out.print("Enter a value of a: ");
        a = scanner.nextInt();
        System.out.print("Enter a value of b: ");
        b = scanner.nextInt();
        System.out.print("Enter a value of c: ");
        c = scanner.nextInt();
        System.out.print("Enter a value of d: ");
        d = scanner.nextInt();
        System.out.print("Enter a value of e: ");
        e = scanner.nextInt();
        System.out.println("Max: " + MyMath2.max(a, b, c, d, e));
        System.out.println("Min: " + MyMath2.min(a, b, c, d, e));
        scanner.close();
   }
}
```

### Output

```
Enter a number to define its Factorial: 13
13! = 1932053504
        === Define Rectangle Surface ===
Enter a Width: 12
Enter a Height: 3
Surface of Rectangle = 36.0 m^2
        === Define Circle Surface ===
Enter a Radius: 4
Surface of Circle = 50.24 m<sup>2</sup>
        === Define Max and Min value ===
Enter a value of a: 4
Enter a value of b: 2
Enter a value of c: 5
Enter a value of d: 2
Enter a value of e: 1
Max: 5
Min: 1
```

## Exercise 7

```
import java.util.Scanner;
class Students {
    String id;
    String name;
    int age;
    void setValues(Scanner scanner) {
        System.out.print("ID: ");
        id = scanner.nextLine();
        System.out.print("Name: ");
        name = scanner.nextLine();
        System.out.print("Age: ");
        age = scanner.nextInt();
    }
    void display(int no) {
        System.out.printf("| %-5d | %-10s | %-15s | %-4d |\n", no, id, name, age);
    }
}
public class ex7 {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        Students[] students = new Students[100];
        int choice;
        int count = 0;
        do {
            System.out.println("===== Menu =====");
            System.out.println("1. Create a student");
            System.out.println("2. List students");
            System.out.println("3. Quit");
            System.out.print("Choose an option:");
            choice = scanner.nextInt();
            scanner.nextLine();
            switch (choice) {
            case 1:
                if (count < students.length) {</pre>
```

```
students[count] = new Students();
                 System.out.println("Student #" + (count + 1) + ":");
                 students[count].setValues(scanner);
                 System.out.println("\nA student is added to the list!\n");
                 count++;
              } else {
                 System.out.println("Student list is full!");
              }
              break;
          case 2:
              if (count == 0) {
                 System.out.println("\nNo students to display.\n");
              } else {
System.out.println("======="");
                 System.out.printf("| %-5s | %-10s | %-15s | %-4s |\n", "No",
"ID", "Name", "Age");
System.out.println("=======");
                 for (int i = 0; i < count; i++) {
                     students[i].display(i + 1);
                 }
System.out.println("=======");
              break;
          case 3:
              System.out.println("Exiting Program...");
              break;
          default:
              System.out.println("Invalid value please try again...");
              break;
          }
       } while (choice != 3);
       scanner.close();
   }
}
```

# Output:

```
===== Menu =====
1. Create a student
2. List students
Quit
Choose an option:1
Student #1:
ID: 123
Name: rith
Age: 18
A student is added to the list!
===== Menu =====
1. Create a student
2. List students
3. Quit
Choose an option:1
Student #2:
ID: 1234
Name: vin
Age: 14
A student is added to the list!
===== Menu =====
1. Create a student
List students
3. Quit
Choose an option:2
_____
     | ID | Name
_____
     123
                rith
                              18
      1234
                | vin
_____
===== Menu =====
1. Create a student
List students
3. Quit
Choose an option:3
Exiting Program...
```

# Exercise 8

#### Source Code:

```
class Category {
```

```
String name;
}
class Product {
    String id;
    String name;
    double price;
    int stock;
    String brand;
    Category category;
    void setValues(String id, String name, double price, int stock, String brand,
Category category) {
       this.id = id;
       this.name = name;
        this.price = price;
       this.stock = stock;
        this.brand = brand;
        this.category = category;
    }
    void display() {
        System.out.println("Product ID: " + id + ", Name: " + name + ", Price: $"
+ price + ", Stock: " + stock
                + ", Brand: " + brand + ", Category: " + category.name);
    }
}
class Video {
   String title;
}
class User {
    String id;
    String username;
    String email;
    int subscribers;
    String country;
    Video video;
    void setValues(String id, String username, String email, int subscribers,
String country, Video video) {
        this.id = id;
        this.username = username;
        this.email = email;
        this.subscribers = subscribers;
        this.country = country;
       this.video = video;
    }
    void display() {
        System.out.println("User ID: " + id + " Username: " + username + " Email:
" + email + " Subscribers: "
                + subscribers + " Country: " + country + " Title: " +
```

```
video.title);
   }
}
class Author {
   String name;
class Book {
   String isbn;
   String title;
   double price;
   int pages;
   String language;
   Author author;
    void setValues(String isbn, String title, double price, int pages, String
language, Author author) {
       this.isbn = isbn;
        this.title = title;
       this.price = price;
       this.pages = pages;
       this.language = language;
       this.author = author;
   }
    void display() {
        System.out.println("Book ISBN: " + isbn + ", Title: " + title + ", Price:
$" + price + ", Pages: " + pages
                + ", Language: " + language + ", Author: " + author.name);
    }
}
public class ex8 {
    public static void main(String[] args) {
        Category category = new Category();
        category.name = "Laptops";
        Product[] productsArr = new Product[3];
        Product product = new Product();
        product.setValues("101", "MacBook Pro", 1999.99, 5, "Apple", category);
        productsArr[0] = product;
        Product product2 = new Product();
        product2.setValues("102", "XPS 15", 1799.99, 7, "Dell", category);
        productsArr[1] = product2;
        Product product3 = new Product();
        product3.setValues("103", "ThinkPad X1", 1599.00, 4, "Lenovo", category);
        productsArr[2] = product3;
        System.out.println("\n-- Product and Category --");
```

```
for (Product p : productsArr) {
            p.display();
        Video videos = new Video();
        videos.title = "Python for Beginners";
        Video videos2 = new Video();
        videos2.title = "Web Development 101";
        Video videos3 = new Video();
        videos3.title = "Data Science with R";
       User[] userArr = new User[3];
       User user = new User();
        user.setValues("201", "Sokha@gmail.com", 1500000, "USA", videos);
        userArr[0] = user;
        User user2 = new User();
        user2.setValues("202", "Davin", "Davin@gmail.com", 2500000, "UK",
videos2);
        userArr[1] = user2;
        User user3 = new User();
        user3.setValues("203", "Rith", "Rith@gmail.com", 3500000, "Canada",
videos3);
        userArr[2] = user3;
        System.out.println("\n-- User and Video --");
        for (User u : userArr) {
           u.display();
        }
        Author author = new Author();
        author.name = "Robert C. Martin";
        Author author2 = new Author();
        author2.name = "Brian W. Kernighan";
        Author author3 = new Author();
        author3.name = "Martin Fowler";
        Book[] booksArr = new Book[3];
        Book book = new Book();
        book.setValues("9780132350884", "Clean Code", 49.99, 464, "English",
author);
        booksArr[0] = book;
        Book book2 = new Book();
        book2.setValues("9780131103627", "The C Programming Language", 39.99, 288,
"English", author2);
        booksArr[1] = book2;
        Book book3 = new Book();
        book3.setValues("9780321127426", "Refactoring", 59.99, 431, "English",
author3);
```

```
booksArr[2] = book3;

System.out.println("\n-- Book and Author --");
for (Book b : booksArr) {
    b.display();
}
}
```

### Output:

```
-- Product and Category --
Product ID: 101, Name: MacBook Pro, Price: $1999.99, Stock: 5, Brand: Apple,
Category: Laptops
Product ID: 102, Name: XPS 15, Price: $1799.99, Stock: 7, Brand: Dell, Category:
Laptops
Product ID: 103, Name: ThinkPad X1, Price: $1599.0, Stock: 4, Brand: Lenovo,
Category: Laptops
-- User and Video --
User ID: 201 Username: Sokha Email: Sokha@gmail.com Subscribers: 1500000 Country:
USA Title: Python for Beginners
User ID: 202 Username: Davin Email: Davin@gmail.com Subscribers: 2500000 Country:
UK Title: Web Development 101
User ID: 203 Username: Rith Email: Rith@gmail.com Subscribers: 3500000 Country:
Canada Title: Data Science with R
-- Book and Author --
Book ISBN: 9780132350884, Title: Clean Code, Price: $49.99, Pages: 464, Language:
English, Author: Robert C. Martin
Book ISBN: 9780131103627, Title: The C Programming Language, Price: $39.99, Pages:
288, Language: English, Author: Brian W. Kernighan
Book ISBN: 9780321127426, Title: Refactoring, Price: $59.99, Pages: 431, Language:
English, Author: Martin Fowler
```

# Link to GitHub Account : Click Here



Note: Viewing in VsCode IDE for better formatting!!!