

## Java Program: Linear Regression Equations

You wrote a Java program to calculate linear regression equations, given sets of x and y values. Below is a summary of the conversation and the calculations.

### Java Program

...

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

```
public class RegressionEq {
```

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

```
        int n;
```

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

```
        System.out.println("Enter number of x values: ");
```

```
        n = myScanner.nextInt();
```

```
        double[] x_values = new double[n];
```

```
        double[] y_values = new double[n];
```

```
        System.out.println("Enter value for x: ");
```

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

```
            System.out.printf("x[%d]: ", i);
```

```
            x_values[i] = myScanner.nextDouble();
```

```
}
```

```
System.out.println("Enter value for y: ");
```

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

```
    System.out.printf("y[%d]: ", i);
```

```
    y_values[i] = myScanner.nextDouble();
```

```
}
```

```
double sumx2 = 0, sumx = 0, sumy = 0, sumxy = 0;
```

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

```
    sumx += x_values[i];
```

```
    sumx2 += x_values[i] * x_values[i];
```

```
    sumy += y_values[i];
```

```
    sumxy += x_values[i] * y_values[i];
```

```
}
```

```
double sq_sumx = sumx * sumx;
```

```
double a = ((n * sumxy) - (sumx*sumy)) / ((n * sumx2) - sq_sumx);
```

```
double b = (sumy - a*sumx)/n;
```

```
double c = 1 / a;
```

```
double d = -b / a;
```

```
System.out.printf("Equation 1: y = %8.5fx + %8.5f%n", a, b);
```

```
System.out.printf("Equation 2: x = %8.5fy + %8.5f", c, d);
```

```
}
```

}

...

### Given Data:

- **x values**: 1, 2, 3, 4, 5, 6, 7

- **y values**: 9, 8, 10, 12, 11, 13, 14

### Results from the Program:

- **Equation 1**:  $y = 0.92857x + 7.28571$

- **Equation 2**:  $x = 1.07692y + -7.84615$

### Explanation and Verification:

- **Sums and Intermediate Calculations**:

-  $\text{sum}x = 28$

-  $\text{sum}y = 77$

-  $\text{sum}x^2 = 140$

-  $\text{sum}xy = 334$

-  $\text{sq\_sum}x = 784$

-  $\text{denom} = 196$

-  $a = 0.92857$

-  $b = 7.28571$

-  $c = 1.07692$

-  $d = -7.84615$

Your program correctly computes the linear regression equation for both  $\hat{y}$  as a function of  $\hat{x}$  and  $\hat{x}$  as a function of  $\hat{y}$ .

The values and the final equations you derived are accurate.