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Assignment - 1

Main file: package

Assign2;

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

    // Create an instance of UserInput to handle user input

    UserInput userInput = new UserInput();


    // Get the user's choice of operation

    String choice = userInput.getStringInput("Choose Operation: +, -, /, *, ^, var, stddev,
    avg");

    // Check if the chosen operation is a basic arithmetic operation (+, -, *, /, ^)

    if (choice.equals("+") || choice.equals("-") || choice.equals("*") || choice.equals("/") ||
choice.equals("^")) {

        // Get user input for two numbers   double n1 = userInput.getDoubleInput("Enter First

Number:");      double n2 = userInput.getDoubleInput("Enter Second Number:");

userInput.closeScanner(); // Close the scanner since input is complete

        // Perform the chosen operation and display the result if

        (choice.equals("+")) {

          System.err.println(Calculator.add(n1, n2));

        } else if (choice.equals("-")) {

          System.err.println(Calculator.subtract(n1,

n2));    } else if (choice.equals("*")) {

          System.err.println(Calculator.multiply(n1, n2));

        } else if (choice.equals("/")) {

          System.out.println(Calculator.divide(n1, n2));

        } else if (choice.equals("^")) {

          System.out.println(Calculator.power(n1, n2));
```

```java
        } else {

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

        }

      } else {

        // For statistical operations (var, stddev, avg), get an array input
double[] arr = userInput.getArrayInput(); userInput.closeScanner(); //
Close the scanner since input is complete
        // Perform the chosen statistical operation and display the result if

        (choice.equals("var")) {

          System.out.println(Calculator.variance(arr));

        } else if (choice.equals("stddev")) {

          System.out.println(Calculator.stddev(arr));

        } else if (choice.equals("avg")) {

          System.out.println(Calculator.mean(arr));

        } else {

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

        }

      }

    }

}
```

Userinput file: package

Assign2;

import java.util.Scanner;

public class UserInput {

  // Scanner object for reading input private

  Scanner scanner;

```java
    // Constructor initializes the Scanner public
 UserInput() { scanner = new
 Scanner(System.in);

    }

    // Method to get a double input from the user with a prompt message public
 double getDoubleInput(String message)
 {       System.out.println(message);       return scanner.nextDouble();

    }

    // Method to get a string input from the user with a prompt message public
 String getStringInput(String message)
 {       System.out.println(message);       return scanner.nextLine();

    }

    // Method to get an array input from the user with a prompt message
 public double[] getArrayInput() { Scanner sc = new Scanner(System.in);

       // Prompt user for the size of the array
       System.out.println("Enter the size of the array:");
int size = sc.nextInt();
       // Create an array to store the input elements
double[] array = new double[size];
       //   Prompt   user   to   enter   each   element   of   the   array
 System.out.println("Enter elements:");

       for (int i = 0; i < size; i++) {
         // Check if the next input is a double if
 (sc.hasNextDouble()) { array[i] =
 sc.nextDouble();

         }
       }
       sc.close(); // Close the inner scanner return
 array;

    }
```

```java
    // Method to close the Scanner when it is no longer needed public

void closeScanner() {    scanner.close();

    }

}


Calculator file: package

Assign2;

import
java.util.Arrays;

public class Calculator {           // Method to

add two numbers         public static double

add(double n1, double n2){ return n1 + n2;

    }

    // Method to subtract two numbers public static

double subtract(double n1, double n2){ return n1 -

n2;

    }

    // Method to multiply two numbers      public         static

double multiply(double n1, double n2){   return n1

* n2;

    }

    // Method to divide two numbers         public      static

double divide(double n1, double n2){      return n1

/ n2;

    }

    // Method to calculate the mean (average) of an array of numbers public

static double mean(double[] arr){ return

Arrays.stream(arr).sum() / arr.length;
```

```java
    }

    // Method to calculate the square root of a number public
static double sqrt(double n){        return
Math.pow(n, 0.5);

    }

    // Method to calculate the standard deviation of an array of numbers public
static double stddev(double[] arr){          double
standardDeviation = 0.0;

        // Calculate the sum of squared differences from the mean for
        (double num : arr) { standardDeviation +=
Math.pow(num - mean(arr), 2);

        }

        // Calculate the square root of the average of squared differences return
Math.sqrt(standardDeviation / arr.length);

    }

    // Method to calculate the variance of an array of numbers
public static double variance(double[] arr){
        // Variance is the square root of the standard deviation return
sqrt(stddev(arr));

    }

    // Method to calculate the power of a number raised to another number
public static double power(double n1, double n2){          return
Math.pow(n1, n2);

    }
}
```

Output:

```
Choose Operation: +, -, /, *, ^, var, stddev, avg
stddev
Enter the size of the array:
4
Enter elements:
2
6
8
4
2.23606797749979
```