Programming in Java Lab

**Assignment 1**

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Q1 Implement a menu-driven Java program (like fib or factorial) to implement these input methods

in java (command line args, Scanner, BufferedReader, DataInputStream, Console )

Code:

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package Assign1;

import java.util.Scanner;

// Class to calculate and print Fibonacci numbers

public class FibonacciScanner {

// Main method to initiate program execution

public static void main(String args[]) {

// Create a Scanner object to take user input

Scanner scan = new Scanner(System.in);

// Prompt the user to enter the number of Fibonacci terms to generate

System.out.print("Enter the number of Fibonacci numbers to generate: ");

int n = scan.nextInt();

// Print the first n Fibonacci numbers

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

System.out.print(fibonacci(i) + " ");

}

// Close the Scanner resource

scan.close();

}

// Recursive method to calculate the nth Fibonacci number

public static int fibonacci(int n) {

// Base cases: 0th and 1st Fibonacci numbers are 0 and 1, respectively

if (n <= 1) {

return n;

} else {

// Iteratively calculate Fibonacci numbers

int a = 0, b = 1, c = 0;

for (int i = 2; i <= n; i++) {

c = a + b; // Calculate the next Fibonacci number

a = b; // Update variables for the next iteration

b = c;

}

return b; // Return the calculated Fibonacci number

}

}

}

Output:



Q2 Implement a simple menu driven calculator in java to implement add, sub, mul, div, sqrt, power,

mean, variance. Implement a separate Calculator class to include all related function inside that class.

Code:

//Main.java

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package Assign1;

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));

} 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.java

package Assign1;

import java.util.Scanner;

public class UserInput {

// Scanner object for reading input

private Scanner scanner;

// 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;

}

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

public void closeScanner() {

scanner.close();

}

}

// Calculator.java

package Assign1;

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;

}

// 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

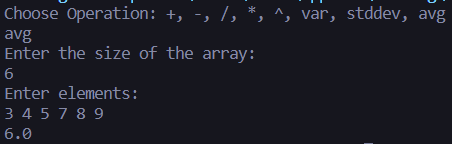
public static double power(double n1, double n2){

return Math.pow(n1, n2);

}

}

Output:



**Checkout the codes on my github and follow for more updates.**

[**https://github.com/vaibhav7766/PIJ**](https://github.com/vaibhav7766/PIJ)