Main.java

```java
1   // Name: Rupankar Das
2   // PRN: 23070126111
3   // Batch: Class of 2027 | B.Tech AIML | B2
4
5   import java.util.Scanner;
6
7   public class Main {
8       public static void main(String[] args) {
9           // Create a Scanner object for user input
10          Scanner scanner = new Scanner(System.in);
11          UserInput userInput = new UserInput(scanner);
12          Calculator calculator = new Calculator();
13
14          System.out.println("Welcome to the Calculator Program!");
15
16          boolean exit = false;
17          while (!exit) {
18              // Display menu options to the user
19              System.out.println("Choose an option:");
20              System.out.println("1. Add\n2. Subtract\n3. Multiply\n4. Divide\n5.
    Fibonacci\n6. Mean\n7. Mode\n8. Exit");
21              int choice = userInput.getNumberInput();
22
23              switch (choice) {
24                  case 1:
25                      // Addition operation
26                      System.out.println("Enter two numbers:");
27                      double a = userInput.getDoubleInput();
28                      double b = userInput.getDoubleInput();
29                      System.out.println("Result: " + calculator.add(a, b));
30                      break;
31                  case 2:
32                      // Subtraction operation
33                      System.out.println("Enter two numbers:");
34                      a = userInput.getDoubleInput();
35                      b = userInput.getDoubleInput();
36                      System.out.println("Result: " + calculator.subtract(a, b));
37                      break;
38                  case 3:
39                      // Multiplication operation
40                      System.out.println("Enter two numbers:");
41                      a = userInput.getDoubleInput();
42                      b = userInput.getDoubleInput();
43                      System.out.println("Result: " + calculator.multiply(a, b));
44                      break;
45                  case 4:
46                      // Division operation
47                      System.out.println("Enter two numbers:");
48                      a = userInput.getDoubleInput();
49                      b = userInput.getDoubleInput();
50                      System.out.println("Result: " + calculator.divide(a, b));
51                      break;
```

```java
52              case 5:
53                  // Fibonacci sequence calculation
54                  System.out.println("Enter a number for Fibonacci sequence:");
55                  int n = userInput.getNumberInput();
56                  System.out.println("Fibonacci result: " +
   calculator.fibonacci(n));
57                  break;
58              case 6:
59                  // Mean calculation
60                  System.out.println("Enter array size:");
61                  int size = userInput.getNumberInput();
62                  double[] arr = userInput.getArrayInput(size);
63                  System.out.println("Mean: " + calculator.mean(arr));
64                  break;
65              case 7:
66                  // Mode calculation
67                  System.out.println("Enter array size:");
68                  size = userInput.getNumberInput();
69                  int[] intArr = userInput.getIntArrayInput(size);
70                  System.out.println("Mode: " + calculator.mode(intArr));
71                  break;
72              case 8:
73                  // Exit the program
74                  exit = true;
75                  System.out.println("Exiting program. Goodbye!");
76                  break;
77              default:
78                  // Handle invalid options
79                  System.out.println("Invalid option. Please try again.");
80          }
81      }
82
83      // Close the scanner
84      scanner.close();
85      }
86 }
87
```

UserInput.java

```java
1   // Name: Rupankar Das
2   // PRN: 23070126111
3   // Batch: Class of 2027 | B.Tech AIML | B2
4
5   import java.util.Scanner;
6
7   public class UserInput {
8       private Scanner scanner;
9
10      public UserInput(Scanner scanner) {
11          this.scanner = scanner; // Initialize scanner
12      }
13
14      public int getNumberInput() {
15          System.out.print("Enter an integer: ");
16          return scanner.nextInt(); // Read and return an integer
17      }
18
19      public double getDoubleInput() {
20          System.out.print("Enter a number: ");
21          return scanner.nextDouble(); // Read and return a double
22      }
23
24      public double[] getArrayInput(int size) {
25          double[] array = new double[size];
26          System.out.println("Enter " + size + " numbers:");
27          for (int i = 0; i < size; i++) {
28              array[i] = scanner.nextDouble(); // Read and store each double
29          }
30          return array; // Return the array of doubles
31      }
32
33      public int[] getIntArrayInput(int size) {
34          int[] array = new int[size];
35          System.out.println("Enter " + size + " integers:");
36          for (int i = 0; i < size; i++) {
37              array[i] = scanner.nextInt(); // Read and store each integer
38          }
39          return array; // Return the array of integers
40      }
41  }
42
```

Assignments/Assignment 1/Calculator.java

```java
1   // Name: Rupankar Das
2   // PRN: 23070126111
3   // Batch: Class of 2027 | B.Tech AIML | B2
4
5   import java.util.HashMap;
6   import java.util.Map;
7
8   public class Calculator {
9
10      // Method to add two numbers
11      public double add(double a, double b) {
12          return a + b; // Return the sum of a and b
13      }
14
15      // Method to subtract second number from first number
16      public double subtract(double a, double b) {
17          return a - b; // Return the difference of a and b
18      }
19
20      // Method to multiply two numbers
21      public double multiply(double a, double b) {
22          return a * b; // Return the product of a and b
23      }
24
25      // Method to divide first number by second number
26      public double divide(double a, double b) {
27          if (b == 0) { // Check if divisor is zero
28              throw new ArithmeticException("Cannot divide by zero"); // Throw
    exception if divisor is zero
29          }
30          return a / b; // Return the quotient of a and b
31      }
32
33      // Method to calculate the nth Fibonacci number
34      public int fibonacci(int n) {
35          if (n <= 1) return n; // Base case: return n if n is 0 or 1
36          return fibonacci(n - 1) + fibonacci(n - 2); // Recursive case: return sum of
    previous two Fibonacci numbers
37      }
38
39      // Method to calculate the mean of an array of numbers
40      public double mean(double[] array) {
41          double sum = 0; // Initialize sum to 0
42          for (double num : array) { // Iterate through each number in the array
43              sum += num; // Add each number to sum
44          }
45          return sum / array.length; // Return the mean (sum divided by number of
    elements)
46      }
47
48      // Method to find the mode of an array of integers
49      public int mode(int[] array) {
```

```java
50          Map<Integer, Integer> frequencyMap = new HashMap<>(); // Create a map to
    store frequency of each number
51          for (int num : array) { // Iterate through each number in the array
52              frequencyMap.put(num, frequencyMap.getOrDefault(num, 0) + 1); // Update
    the frequency of each number
53          }
54
55          int mode = array[0]; // Initialize mode to the first element of the array
56          int maxCount = 0; // Initialize maxCount to 0
57          for (Map.Entry<Integer, Integer> entry : frequencyMap.entrySet()) { //
    Iterate through the frequency map
58              if (entry.getValue() > maxCount) { // Check if current frequency is
    greater than maxCount
59                  maxCount = entry.getValue(); // Update maxCount
60                  mode = entry.getKey(); // Update mode
61              }
62          }
63          return mode; // Return the mode
64      }
65  }
66
```

```
Welcome to the Calculator Program!
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 1
Enter two numbers:
Enter a number: 23
Enter a number: 45
Result: 68.0
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 2
Enter two numbers:
Enter a number: 12
Enter a number: 45
Result: -33.0
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 3
Enter two numbers:
Enter a number: 567
Enter a number: 234
Result: 132678.0
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 4
Enter two numbers:
Enter a number: 2343
Enter a number: 23
Result: 101.8695652173913
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
```

```
Enter an integer: 5
Enter a number for Fibonacci sequence:
Enter an integer: 12
Fibonacci result: 144
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 6
Enter array size:
Enter an integer: 5
Enter 5 numbers:
12 123 12 54 23
Mean: 44.8
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 7
Enter array size:
Enter an integer: 5
Enter 5 integers:
12 46 48 234 56
Mode: 48
Choose an option:
1. Add
2. Subtract
3. Multiply
4. Divide
5. Fibonacci
6. Mean
7. Mode
8. Exit
Enter an integer: 8
Exiting program. Goodbye!




[ Github Link: https://github.com/mvrck-dev/Java-Lab/tree/main/Assignments/Assignment%201 ]
```