**Semester Project Documentation**

**Semester Project Title**: **Scientific Calculator.**

**Student Details**

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| --- | --- | --- | --- |
|  | Student Name | Student Reg # | Student Degree |
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**Main Features**

1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Power
6. Factorial
7. Modulus
8. Percentage
9. Permutation
10. Combination
11. Sine
12. Cosine
13. Tangent
14. Secant
15. Cosecant
16. Cotangent
17. Natural Logarithm
18. Square Root

**Types of Users**

1.Every human being of all ages can be the users of this calculator.

**Requirements Breakdown**

1. **Arithmetic operation**

1.1- Asks for two inputs at start and performs the function. After this, the user is asked whether he wants to perform the function for new input. This continues until the user enters the invalid input.

1. **Factorial**

2.1-Recursion is used in this function.

2.2- The recursion continues until the base condition is met.

1. **Power**

3.1-Asks the user to input two numbers. First is the base and the other is its power.

3.2-Now the ‘for’ loop continues multiplication until the power reaches the value of the required power of the base.

1. **Trigonometric Functions**

4.1-The functions of sine and cosine are programmed using the Taylor series.

4.2- Now the values of the rest of the trigonometric functions are calculated by choosing the appropriate numerator and denominator. The user will choose the desired trigonometric function using switch statement.

1. **Natural Logarithm**

5.1-Natural logarithm is programmed using the Taylor series.

5.2- The program displays an error when the user enters a value that is zero or less than zero.

5.3-The value is calculated using 1000 terms of the series.

1. **Square Root**

6.1-square root is programed by iteration and the method used is old Newtonian method to calculate the square root

**Features to Codding Matrix**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sr  no. | Feature Name | Concept Used | Functions Created | Variables / Obj Created | Line of Code Written |
| 1 | Arithmetic operations | Simple operation | 6 | 20 | 115 |
| 2 | Factorial | Recursion | 1 | 2 | 18 |
| 3 | Power | Loops | 1 | 3 | 21 |
| 4 | Trigonometric Functions | Taylor series | 2 | 15 | 125 |
| 5 | Natural Logarithm | Taylor series | 1 | 1 | 32 |
| 6 | Square Root | Loops | 1 | 2 | 26 |