

# EfCalc Pro - User's Manual



A Basic Scientific Calculator

# Contents

EfCalc Pro - User's Manual.....	1
GPL3 License Notice.....	3
1. Introduction.....	4
2. User Interface.....	4
3. Basic Operations.....	4
Performing Basic Arithmetic:.....	4
Decimal Point (.):.....	4
Equals (=):.....	4
4. Scientific Operations.....	5
Trigonometric Functions:.....	5
Logarithmic Functions:.....	5
Square Root:.....	5
Exponential Functions:.....	5
Power/Exponentiation:.....	5
Absolute Value:.....	5
Constants:.....	5
5. Memory Functions.....	5
6. Special Features.....	6
ANS Button:.....	6
Grouping Symbols:.....	6
Clear Functions:.....	6
7. Examples of Usage.....	6
8. Troubleshooting.....	6
9. Credits.....	7

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PyCalc Pro - A Python-based Scientific Calculator

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# 1. Introduction

**EfCalc Pro** is a fully functional scientific calculator designed to handle both basic arithmetic and advanced scientific operations. With a simple, intuitive interface, it allows users to perform calculations efficiently while offering functionality like trigonometry, logarithms, and memory storage. This calculator is suitable for students, engineers, and anyone who needs a reliable tool for performing mathematical computations.

This manual should help users navigate the features of **EfCalc Pro**. With support for both basic and advanced operations, this calculator is equipped to handle everyday calculations and more specialized scientific computations.

## 2. User Interface

The EfCalc Pro interface is composed of the following sections:

- **Display Panel:** The top area shows your input and results.
- **Keypad:**
  - **Number Pad:** Buttons for digits (0–9) and the decimal point (.)
  - **Arithmetic Operators:** +, -, \*, /, =
  - **Parentheses and Grouping Symbols:** ( ), { }, [ ]
  - **Scientific Functions:** sin, cos, tan, log, sqrt, exp, etc.
  - **Constants:**  $\pi$  (pi), e
  - **Memory Functions:** M, M+, M-
  - **Utility Buttons:** ANS, CLR, CE, EXE

## 3. Basic Operations

### Performing Basic Arithmetic:

- **Addition (+):** Adds two or more numbers. Example:  $5 + 3 = 8$
- **Subtraction (-):** Subtracts one number from another. Example:  $10 - 2 = 8$
- **Multiplication (\*):** Multiplies numbers. Example:  $6 * 7 = 42$
- **Division (/):** Divides one number by another. Example:  $20 / 4 = 5$

### Decimal Point (.):

- Use the decimal point button to enter numbers with fractional parts. Example:  $3.14$

### Equals (=):

- After entering your expression, press the = button to calculate the result. Alternatively, you can press EXE to evaluate the expression.

## 4. Scientific Operations

### Trigonometric Functions:

- **sin(x)**: Calculates the sine of angle  $x$  (in radians).
- **cos(x)**: Calculates the cosine of angle  $x$  (in radians).
- **tan(x)**: Calculates the tangent of angle  $x$  (in radians).
  - **Note**: For trigonometric operations, make sure to input angles in radians. You can convert degrees to radians by multiplying by  $\pi/180$ .

### Logarithmic Functions:

- **log(x)**: Calculates the base-10 logarithm of  $x$ . Example:  $\log(100) = 2$

### Square Root:

- **sqrt(x)**: Calculates the square root of  $x$ . Example:  $\text{sqrt}(16) = 4$

### Exponential Functions:

- **exp(x)**: Calculates the value of  $e^x$ . Example:  $\exp(1) = 2.71828$

### Power/Exponentiation:

- **^**: Raises a number to a power. Example:  $2^3 = 8$  (Note: this is equivalent to  $2^{**}3$  in Python).

### Absolute Value:

- **abs(x)**: Calculates the absolute value of  $x$ . Example:  $\text{abs}(-5) = 5$

### Constants:

- **$\pi$  (pi)**: Inserts the value of  $\pi$  (3.14159) into the display.
- **e**: Inserts the value of Euler's constant  $e$  (2.71828) into the display.

## 5. Memory Functions

**EfCalc Pro** provides memory functionality to store and recall values during calculations.

- **M**: Stores the current displayed value in memory.
- **M+**: Adds the displayed value to the current memory value.
- **M-**: Subtracts the displayed value from the current memory value.

### Example of Memory Usage:

1. Type 5 and press M. The number 5 is stored in memory.
2. Type 3 and press M+. The memory now stores  $5 + 3 = 8$ .
3. Type 4 and press M-. The memory now stores  $8 - 4 = 4$ .

## 6. Special Features

### ANS Button:

The **ANS** button retrieves the last calculated result. This allows you to use the previous answer in a new calculation.

### Example:

1. Calculate  $5 + 3$  (Result = 8).
2. Press ANS and then  $\times 2$ . The result will be  $8 \times 2 = 16$ .

### Grouping Symbols:

- **Parentheses ( )**: Use for grouping expressions to control the order of operations. Example:  $(2 + 3) \times 4 = 20$
- **Square Brackets [ ] and Curly Braces { }**: These work similarly to parentheses but are used for more complex expressions that involve multiple levels of grouping.

### Clear Functions:

- **CLR**: Clears the entire display.
- **CE**: Clears the last character entered.

## 7. Examples of Usage

### 1. Basic Arithmetic:

- **Input**:  $5 + 3 \times 2 =$
- **Output**: 11 (Multiplication happens before addition).

### 2. Using Trigonometric Functions:

- **Input**:  $\sin(30 \times \pi / 180) =$
- **Output**: 0.5 (Convert degrees to radians using  $\pi/180$ ).

### 3. Exponential Calculations:

- **Input**:  $\exp(1)$
- **Output**: 2.71828 (This is  $e^1$ ).

### 4. Memory Usage:

- **Step 1**: Type 5 and press M. Memory now contains 5.
- **Step 2**: Type 4 and press M+. Memory now contains 9.
- **Step 3**: Press ANS after calculating a new result to use the stored value.

## 8. Troubleshooting

- **Error Message**: If an invalid operation is performed (e.g., dividing by zero), "Error" will appear on the display. Press CLR to reset the display.
- **Unexpected Results**: Ensure you are inputting values correctly, especially when using radians for trigonometric functions.

- **ANS Not Working:** Make sure you've performed a previous calculation before pressing ANS.

## 9. Credits

EfCalc Pro originated as a personal hobby project by Dr. Eric O. Flores, initially developed in C. It was later transformed into Python, utilizing the PyQt5 framework to provide a modern, user-friendly graphical interface. The goal of EfCalc Pro is to offer a versatile and robust tool for both scientific and everyday mathematical calculations, combining power with ease of use.