ULTIMATE SCIENTIFIC CALCULATOR v6.0 — Documentation

1. Overview

Ultimate Scientific Calculator v6.0 is a feature-rich, terminal-based calculator written in C. It provides 40 mathematical operations, including arithmetic, trigonometric, logarithmic, hyperbolic, rounding, and conversion functions. It uses ANSI escape sequences for color formatting and Unicode symbols for a professional terminal UI.

2. Key Features

- Interactive Menu System
- Separate Inputs per line
- Error Handling
- Formatted Output
- Cross-Platform Terminal Support
- Clean, Modular Code

3. Functional Components

Includes stdio.h, stdlib.h, math.h for math and I/O.

Utility Functions:

- clear_screen(): Clears terminal
- set_color(): Sets color
- pause_screen(): Waits for ENTER
- factorial(): Computes n!

UI Functions:

- print_header(): Prints banner
- print_menu(): Shows all 40 operations

4. Supported Operations

Covers arithmetic, trigonometric, logarithmic, hyperbolic, inverse, rounding, and conversion functions (1–40). Includes addition, subtraction, power, square root, sin, cos, tan, factorial, exponential, log, min, max, reciprocal, etc.

5. Error Handling

Handles division by zero, invalid logarithm domains, invalid trig domains, and invalid choices.

6. Program Flow

Menu → Input → Calculation → Result → Pause → Repeat.

7. UI

Uses ANSI colors (cyan, yellow, green, red) and Unicode borders for clean layout.

8. Performance

All operations O(1), factorial O(n). Uses double precision.

9. Limitations

No GUI popup, factorial overflow for large n, ANSI color limits on older consoles.

10. Future Improvements

Expression parsing, history, save to file, input validation, unit conversions.

11. Sample Interaction

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Select operation: 5
Enter base: 2
Enter exponent: 3
Result = 8.0000000000
Press ENTER to continue...
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12. Author Notes

Demonstrates modular C design, terminal UI, math library, and structured programming.