Creating an advanced calculator involves incorporating a variety of functions to handle a broad range of mathematical operations. Here’s a list of essential functions and features for a comprehensive advanced calculator:

**Basic Arithmetic Functions**

1. **Addition (+)**
2. **Subtraction (−)**
3. **Multiplication (×)**
4. **Division (÷)**
5. **Exponentiation (x^y)**
6. **Square Root (√x)**

**Advanced Arithmetic Functions**

1. **Logarithms (log, ln)**
   * Base 10 (log)
   * Natural Logarithm (ln)
2. **Factorials (n!)**
3. **Permutations and Combinations**
   * Permutations (nPr)
   * Combinations (nCr)

**Trigonometric Functions**

1. **Sine (sin)**
2. **Cosine (cos)**
3. **Tangent (tan)**
4. **Inverse Trigonometric Functions**
   * Arcsine (asin)
   * Arccosine (acos)
   * Arctangent (atan)

**Hyperbolic Functions**

1. **Hyperbolic Sine (sinh)**
2. **Hyperbolic Cosine (cosh)**
3. **Hyperbolic Tangent (tanh)**

**Statistical Functions**

1. **Mean (average)**
2. **Median**
3. **Mode**
4. **Standard Deviation**
5. **Variance**

**Algebraic Functions**

1. **Polynomial Functions**
2. **Roots of Equations**
   * Solve linear, quadratic, cubic equations
3. **Complex Numbers**
   * Operations with complex numbers
4. **Matrix Operations**
   * Addition, subtraction, multiplication, inversion

**Calculus Functions**

1. **Differentiation**
   * Find the derivative of functions
2. **Integration**
   * Find the integral of functions
3. **Limits**
   * Evaluate limits of functions

**Financial Functions**

1. **Compound Interest**
2. **Future Value**
3. **Present Value**
4. **Loan Amortization**

**Graphing Capabilities**

1. **Plotting Functions**
   * Graph equations and inequalities
2. **Parametric Equations**
3. **Polar Coordinates**

**Unit Conversions**

1. **Length, Area, Volume**
2. **Temperature**
3. **Currency**

**Programming Features**

1. **Custom Functions**
2. **Memory Storage**
   * Store and recall variables
3. **User-defined Variables**

**Miscellaneous**

1. **Scientific Notation**
2. **Binary, Octal, Decimal, Hexadecimal Conversions**
3. **Angle Unit Conversion**
   * Degrees, Radians, Gradians

Incorporating these functions can make a calculator robust and versatile, suitable for both everyday calculations and more specialized mathematical tasks.

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