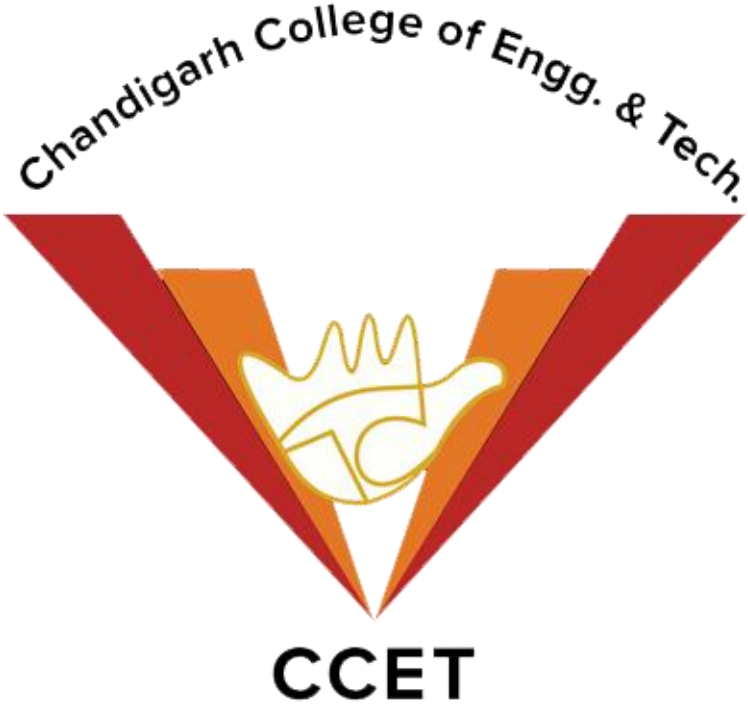
MAJOR PROJECT SRS(Software Requirements Specification)



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1. Introduction:-

1.1. Purpose

The purpose of this document is to define the functional and non-functional requirements for the Calculator App developed using Android Studio with Java. The application provides various calculation functionalities such as basic arithmetic operations, an EMI calculator, currency conversion, unit converter, factorial, square, cube calculations, a Stock Profit Calculator with support for multiple brokers, and a History Feature to store past calculations.

This document serves as a guide for developers, testers, and stakeholders to understand the app's purpose, design, and requirements.

1.2. Scope

The New Calculator app is a comprehensive mathematical, financial, and utility tool designed to assist users in performing a wide range of calculations efficiently. With a user-friendly interface and real-time data integration, this app is useful for students, professionals, traders, and general users.

The key features of the app include:

- **Basic Arithmetic Calculations** – Supports addition, subtraction, multiplication, and division.
- **Scientific Calculator** – Performs advanced mathematical operations, including factorials, powers, and trigonometric functions.
- **Currency Converter** – Converts values between different currencies using real-time exchange rates with offline support.
- **Unit Converter** – Converts units across various categories such as length, weight, temperature, area, volume, speed, and time.
- **Number System Converter** – Converts numbers between binary, decimal, octal, and hexadecimal systems.
- **EMI Calculator** – Helps users calculate monthly EMI payments based on loan amount, interest rate, and tenure.
- **Stock Profit Calculator** – Computes profit/loss for stock traders while considering brokerage fees and taxes.
- **Tax Calculator** – Estimates income tax based on country-specific tax brackets.
- **Discount Checker** – Calculates the final price after applying discounts, useful for shopping.

- **BMI Calculator** – Helps users assess their body mass index using height and weight.
- **Calories Calculator** – Estimates daily calorie requirements and calculates calories burned during exercises.
- **History Feature** – Saves previous calculations from both the main and scientific calculators for easy retrieval.
- **Theme Customization** – Allows users to switch between **Light Mode and Dark Mode** for better visibility.

1.3. Definitions

- EMI: Equated Monthly Installment
- F&O: Futures and Options
- GST: Goods and Services Tax
- UI: User Interface
- API: Application Programming Interface
- SQLite: Lightweight database for storing application data locally
- Stock Trading: Buying and selling of financial assets such as shares.
- Brokerage: A fee charged by brokers for executing a stock market trade.
- **BMI**: Body Mass Index – A measurement that evaluates an individual's weight in relation to their height to assess body fat levels.
- **BMR**: Basal Metabolic Rate – The number of calories required to keep the body functioning at rest.
- **TDEE**: Total Daily Energy Expenditure – The total number of calories burned in a day, considering activity levels.

1.4. References

- Android Developer Documentation (developer.android.com)
- Java Documentation (docs.oracle.com)
- Google Play Store Guidelines (play.google.com)
- Financial Calculations Reference (Investopedia, NSE India)
- SQLite Documentation (sqlite.org)

2. Overall Description:-

2.1. Product Perspective

The Calculator App is a standalone mobile application that does not require an internet connection for most calculations. However, certain features, such as the currency converter, will rely on real-time exchange rate data fetched via an API. The history feature ensures that users can retrieve their past calculations at any time, making the app useful for long-term financial planning.

2.2. Product Functions

The major functionalities of the **New Calculator** app include:

- **Basic Calculator** – Performs simple arithmetic operations like addition, subtraction, multiplication, and division.
- **Scientific Calculator** – Supports advanced mathematical functions such as powers, factorials, logarithms, and trigonometric calculations.
- **Financial Calculations** – Includes an **EMI calculator** for loan planning and a **stock profit calculator** that accounts for brokerage fees and taxes.
- **Currency Converter** – Converts values between different currencies using real-time exchange rates with offline support.
- **Unit Converter** – Converts units across multiple categories, including **length, weight, temperature, area, volume, speed, and time**.
- **Number System Converter** – Converts numbers between **binary, decimal, octal, and hexadecimal** systems.
- **Tax Calculator** – Estimates **income tax** based on country-specific tax brackets.
- **Discount Checker** – Helps users calculate the final price after applying discounts.
- **BMI Calculator** – Computes **Body Mass Index (BMI)** based on height and weight.
- **Calories Calculator** – Estimates **daily calorie needs** and **calories burned** during exercises.
- **History Feature** – Stores and retrieves past calculations for both **standard and scientific modes**.
- **Detailed Result Display** – Provides a **breakdown of financial calculations**, including **brokerage, taxes, and net profit/loss** in stock trading.
- **Theme Customization** – Users can switch between **Dark Mode and Light Mode** for a personalized experience.

2.3. User Characteristics

The primary users of this app include:

- General users: People who need a quick and easy-to-use calculator.
- Students: Users who require advanced calculations such as factorial, square, and cube.
- Financial professionals: Individuals managing finances and loans.
- Stock traders: Investors analyzing profit/loss scenarios before making decisions.
- Business Owners: Small business owners who need basic financial computations.

2.4. Constraints

- **Internet Requirement** – Some features, such as **currency conversion and stock market data**, require an active internet connection for real-time updates.
- **Storage Limitation** – The **history feature** is limited by device storage capacity, which may affect the number of past calculations stored.
- **Accuracy Dependency** – The accuracy of **stock profit, tax, and calorie calculations** depends on correct input values, brokerage rates, GST percentages, and real-time data availability.
- **Device Compatibility** – The application is designed to function efficiently on **Android devices with at least 2GB RAM**, but performance may vary on lower-end devices.
- **API Limitations** – Features like **currency conversion and calorie fetching** depend on external APIs, which may have usage restrictions or require periodic updates.
- **Battery Consumption** – Real-time calculations and API calls may consume more power, especially when multiple features are used frequently.

3. Specific Requirements:-

3.1. Functional Requirements

3.1.1 Basic Calculator

- Supports standard arithmetic operations: addition, subtraction, multiplication, and division.
- Provides instant and accurate results.
- Allows decimal values and large numbers.

- Displays error messages for invalid inputs (e.g., division by zero).
- Supports both portrait and landscape orientations.

3.1.2 Scientific Calculator

- Performs trigonometric, logarithmic, exponential, and factorial calculations.
- Displays mathematical expressions like 7^2, 7^3, and 7! in the expression box while showing the computed result.
- Supports parentheses and order of operations (BODMAS).
- Provides an interactive UI with function buttons.

3.1.3 EMI Calculator

- Accepts user input for loan amount, interest rate, and loan tenure.
- Calculates monthly EMI, total interest payable, and total repayment amount.
- Provides graphical representation of EMI breakdown.
- Allows users to compare multiple EMI plans.
- Displays amortization schedule for detailed analysis.

3.1.4 Currency Converter

- Fetches real-time exchange rates from an online API.
- Supports conversion between multiple international currencies.
- Stores and displays currency conversion history.
- Enables offline conversion using the last fetched rates.
- Provides a user-friendly selection interface for choosing currencies.

3.1.5 Stock Profit Calculator

- Accepts user input for buy price, sell price, quantity, and brokerage fees.
- Automatically calculates GST and other government charges.

- Computes net profit/loss with a detailed breakdown.
- Supports different stock brokers with predefined brokerage structures.
- Allows users to choose between Intraday, Delivery Equity, F&O Futures, and F&O Options.
- Displays detailed results, including brokerage, taxes, and final profit/loss.

3.1.6 Tax Calculator

- Calculates income tax based on country-specific tax brackets.
- Supports different tax slabs and deduction categories.
- Provides detailed breakdown of taxable income, deductions, and total tax payable.
- Includes GST tax calculator for business users.

3.1.7 Unit Converter

- Converts between length, weight, temperature, volume, speed, area, and time.
- Provides accurate and real-time unit conversions.
- Allows users to select units from an intuitive drop-down menu.
- Stores frequently used conversions for quick access.
- Supports both metric and imperial systems.

3.1.8 Number System Converter

- Converts numbers between binary, decimal, octal, and hexadecimal.
- Supports large numbers and accurate conversions.
- Provides step-by-step breakdown of conversions.

3.1.9 Discount Checker

- Calculates discounted price based on original price and discount percentage.
- Helps users compare different discount offers.

3.1.10 BMI Calculator

- Accepts height and weight to calculate Body Mass Index (BMI).
- Provides BMI classification (Underweight, Normal, Overweight, Obese).
- Displays graphical representation of BMI.

3.1.11 Calories Calculator

- Estimates daily calorie needs using BMR and TDEE.
- Allows users to select activity level for more accurate calorie estimates.
- Calculates calories burned during exercises.
- Includes a food calorie lookup feature with real-time API support.
- Provides food name suggestions when entering food names.
- Displays a range of calories for different foods.
- Calculates calorie values per 100 grams automatically.

3.1.12 Object Measurement (Camera-based Measurement)

- Measures height, width, and length of objects using the camera.
- Uses computer vision and AI algorithms for accurate measurements.
- Displays measurements in different units (cm, m, inches, feet, etc.).

3.1.13 History Feature

- Automatically saves all performed calculations.
- Allows users to search, filter, and delete previous calculations.
- Stores calculations persistently using SQLite database.
- Provides an option to export history as a text or CSV file.
- Enables users to mark important calculations as favorites.

3.1.14 Theme Customization

- Allows users to switch between Dark Mode and Light Mode.
- Saves user preference for the selected theme.

3.1.15 Settings & Customization

- Provides options to clear history, reset preferences, and update API keys.
- Allows users to enable/disable certain features based on their needs**.**

3.2 Non-Functional Requirements

- Performance: All calculations should be executed within milliseconds.
- Security: No sensitive user data should be stored or shared.
- Usability: The app should have an intuitive interface for a smooth user experience.
- Scalability: The architecture should support future enhancements and additional features.
- Reliability: The app should function correctly under all standard usage scenarios.
- Portability: The app should be compatible with Android versions 6.0 and above.
- Accessibility: The app should support large text mode and high contrast mode for better readability.
- Offline Support: Certain features like the currency converter and calorie lookup should work offline with the last available data.

4. System Architecture:-

4.1. Overview

The Calculator App follows a three-layered architecture, ensuring modularity and maintainability. The three primary layers include:

- Presentation Layer (UI Layer): Manages user interactions and displays results.
- Application Logic Layer (Business Logic): Processes calculations and logic for different modules.
- Data Storage Layer: Stores history, preferences, and cached data.

4.2. Components

4.2.1. User Interface (UI Layer)

- Activity & Fragment-based UI using XML layouts.
- Material Design Principles for an intuitive user experience.
- Toolbar with Navigation Drawer for feature access.

4.2.2. Business Logic Layer

- Java-based classes for handling calculations.
- Separate modules for arithmetic, EMI, currency conversion, and stock profit calculations.
- Real-time API integration for currency exchange rates.

4.2.3. Data Storage Layer

- SQLite Database for storing history and user preferences.
- SharedPreferences for lightweight data storage.
- Local Caching for improved performance.

4.3. Data Flow

1. User inputs values via UI.
2. Processing in Business Logic Layer based on selected operation.
3. Results stored in SQLite (if applicable).
4. Results displayed to the user.

5. Use Case Scenarios:-

5.1. Use Case 1: Performing Basic Arithmetic Calculation

Actors: User

Description: The user opens the calculator app and performs an arithmetic operation (addition, subtraction, multiplication, or division).

Flow of Events:

1. User launches the app.
2. User enters two numbers.
3. User selects an arithmetic operation.
4. The result is displayed on the screen.

5.2. Use Case 2: Calculating EMI

Actors: User

Description: The user calculates EMI based on loan amount, interest rate, and tenure.

Flow of Events:

1. User selects EMI calculator.
2. User enters loan amount, interest rate, and tenure.
3. User taps the “Calculate” button.
4. The monthly EMI amount is displayed.

5.3. Use Case 3: Storing and Retrieving Calculation History

Actors: User

Description: The user saves previous calculations and retrieves them later.

Flow of Events:

1. User performs a calculation.
2. The app automatically saves the result.
3. User navigates to the history section.
4. User selects a previous calculation to view its details.

5.4. Use Case 4: Using the Currency Converter

Actors: User

Description: The user converts a value from one currency to another using real-time exchange rates.

Flow of Events:

1. User selects the currency converter.
2. User enters the amount and selects the source and target currencies.
3. User taps the “Convert” button.
4. The converted amount is displayed along with the exchange rate used.

5.5. Use Case 5: Calculating Stock Profit/Loss

Actors: Stock trader, investor

Description: The user calculates stock profit/loss, considering brokerage fees and taxes.

Flow of Events:

1. User selects the stock profit calculator.
2. User enters buy price, sell price, quantity, and broker selection.
3. User selects the type of transaction (Intraday, Delivery, F&O Futures, F&O Options).
4. User taps “Calculate.”
5. The app displays a detailed breakdown of profit/loss, including brokerage, GST, and net gain.

5.6. Use Case 6: Using the Unit Converter

Actors: User

Description: The user converts values between different units of measurement.

Flow of Events:

1. User selects the unit converter.

2. User chooses the measurement category (e.g., length, weight, temperature, volume, speed).
3. User enters a value and selects the source and target units.
4. User taps “Convert.”
5. The c
6. onverted value is displayed.

6. Performance Metrics:-

To ensure the Calculator App meets the required performance standards, the following metrics will be measured:

6.1. Response Time

- The app should process basic arithmetic calculations (addition, subtraction, multiplication, and division) in less than 100 milliseconds.
- Complex calculations like EMI, stock profit, and currency conversion should be completed in under 500 milliseconds.

6.2. Memory Usage

- The application should use less than 50MB of RAM during standard operations.
- The history storage feature should optimize memory usage to prevent excessive storage consumption.

6.3. CPU Utilization

- The app should not exceed 15% CPU usage during complex calculations on mid-range devices.
- Background tasks like auto-saving history should run efficiently without affecting the main operations.

6.4. Battery Consumption

- The app should not consume more than 3% battery per hour during continuous usage.

- Energy-efficient processing techniques should be implemented to reduce unnecessary power consumption.

6.5. Storage Requirements

- The app size should remain under 20MB for installation.
- Cached data, including history and preferences, should not exceed 10MB unless explicitly allowed by the user.

6.6. Network Performance (for Online Features)

- Real-time currency conversion API calls should complete within 2 seconds on a 4G connection.
- The app should provide a fallback mechanism if the internet is unavailable.

7. Testing & Validation:-

7.1. Unit Testing

- Each function, including arithmetic operations, EMI calculations, and stock profit calculations, will be tested individually.
- Automated unit tests will validate input handling and expected output accuracy.

7.2. Integration Testing

- Ensures that all modules (basic calculations, history storage, currency conversion, etc.) work together without conflicts.
- Validates data flow between components and verifies seamless transitions.

7.3. Performance Testing

- Load testing to simulate multiple calculations at once and ensure stable performance under heavy usage.
- Response time testing to ensure calculations execute within the defined performance metrics.

7.4. Usability Testing

- Conducted with real users to evaluate ease of use, accessibility, and overall user experience.

- Ensures intuitive navigation and user-friendly interface.

7.5. Security Testing

- Tests data encryption for stored history and calculations.
- Ensures API security for currency conversion and online features.

7.6. Validation Testing

- Confirms that the app meets all specified requirements in the SRS document.
- Compares actual results with expected outcomes to ensure correctness and compliance.

8. Future Enhancements:-

8.1. Advanced Graphical Calculator

- Introduce a graphical calculator feature to plot equations and visualize mathematical functions.
- Allow users to analyze complex mathematical problems with graph representation.

8.2. Voice Command Integration

- Implement voice recognition to allow users to perform calculations hands-free.
- Improve accessibility for users with disabilities.

8.3. Cloud Storage for History

- Enable users to back up and restore their calculation history using cloud storage.
- Provide synchronization across multiple devices.

8.4. AI-Based Smart Suggestions

- Introduce AI-based recommendations for financial calculations, such as loan suggestions based on income and expenses.
- Provide automated insights for stock trading calculations.

8.5. Multi-Language Support

- Expand language support to cater to a global audience.
- Allow users to switch between languages seamlessly.

8.6. Dark Mode & Custom Themes

- Add a dark mode for reduced eye strain during nighttime use.
- Allow users to customize the app theme to their preference.

9.User Interface Design:-

The user interface (UI) of the **New Calculator App** is designed to be **intuitive, visually appealing, and user-friendly** for both beginners and advanced users. It follows **Material Design principles** to ensure a seamless and consistent experience. The UI is structured with **smooth navigation, clear typography, and responsive buttons** for easy interaction.

9.1. Home Screen

- Displays a **simple calculator interface** with buttons for **basic arithmetic operations**.
- Includes a **navigation menu** to switch between different modes:
    - Standard Calculator
    - EMI Calculator
    - Currency Converter
    - Stock Profit Calculator
    - Tax Calculator
    - BMI & Calories Calculator
    - Scientific Calculator
    - Unit & Number System Converter

    - Discount Checker
    - History Feature
- Provides a Settings icon to allow users to customize preferences such as theme selection (Dark/Light mode), language, and default calculation mode.

9.2. Standard Calculator Interface

- A numeric keypad with buttons for numbers 0-9.
- Operators: Addition (+), Subtraction (-), Multiplication (*), and Division (/) placed for easy accessibility.
- Additional functions:
    - **Clear (C)** button to reset the input.
    - **Backspace (⌫)** button for corrections.
    - **Equals (=)** button to compute results.
- A display area at the top showing the entered numbers, expressions, and computed results.

9.3. EMI Calculator Interface

- Three input fields:
    - Loan Amount
    - Interest Rate (%)
    - Loan Tenure (months/years)
- A "Calculate" button that instantly processes and displays:
    - Monthly EMI
    - Total Interest Payable
    - Total Payment (Principal + Interest)
- An option to save the calculation in history for future reference.

9.4. Currency Converter UI

- Two dropdown menus to select source currency and target currency.

- An input field to enter the amount for conversion.
- A "Convert" button that retrieves real-time exchange rates and displays the converted amount.
- A refresh button to update exchange rates with the latest data.
- Offline mode support for previously fetched exchange rates.

9.5. Stock Profit Calculator UI

- Input fields for:
    - Buy Price
    - Sell Price
    - Quantity
    - Brokerage Selection
- A dropdown menu to choose the trade type:
    - Intraday
    - Delivery
- A "Calculate" button that provides a detailed breakdown including:
    - Profit/Loss Calculation
    - Brokerage Charges
    - Taxes (GST, STT, SEBI, Exchange Charges, etc.)
    - Net Earnings (Final Profit/Loss after deductions)
- A history-saving feature to track previous calculations.

9.6. Tax Calculator Interface

- Input fields for:
    - Income Amount

    - Deductions (if applicable)
    - Tax Slab Selection (Country-Specific Tax Brackets)
- A "Calculate Tax" button that provides:
    - Taxable Income
    - Total Tax Payable
    - Net Income After Tax

9.7. BMI & Calories Calculator Interface

- BMI Calculator:
    - Input fields for Height (cm/inches) and Weight (kg/lbs).
    - A "Calculate BMI" button to display BMI with classification (Underweight, Normal, Overweight, Obese).
- Calories Calculator:
    - Fields for Age, Gender, Weight, Height, and Activity Level.
    - A "Calculate Calories" button that estimates:
        - Daily Calorie Needs (BMR & TDEE)
        - Calories Burned in Different Exercises
    - A food calorie search feature using an API for real-time food calorie information.

9.8. Scientific Calculator Interface

- Supports advanced mathematical functions, including:
    - Trigonometry (sin, cos, tan, etc.)
    - Logarithm (log, ln)
    - Exponents and Roots (x^2, x^3, $\sqrt{}$, $\sqrt[3]{}$, etc.)
    - Factorial (n!)

- **Expression Display:**
    - Shows operations in a readable format like 7^2, 7^3, 7! in the input field (solutionTv)
    - Displays computed results in (resultTv).

9.9. Calculation History UI

- A dedicated screen that lists previous calculations with timestamps.
- Users can click on any entry to view details or re-use past calculations.
- A "Clear History" option to delete stored records.

9.10. Unit Converter Interface

- Allows users to convert between different units, including:
    - Length, Weight, Volume, Temperature, Speed, Time, Area, and Energy.
- Dropdown menus for selecting unit categories and specific units.
- An input field for entering the value to be converted.
- A "Convert" button that instantly displays the converted result.

9.11. Number System Converter Interface

- Converts numbers between Binary, Decimal, Octal, and Hexadecimal.
- Input field for entering the number.
- Dropdown menu to select input and output number systems.
- "Convert" button to display the converted result instantly.

9.12. Discount Checker UI

- Input fields for:
    - Original Price
    - Discount Percentage

- "Calculate Discount" button to show:
    - Final Price after Discount
    - Total Savings Amount

9.13. Theme Customization

- Dark Mode & Light Mode toggle available in Settings.
- The theme preference is saved and applied automatically upon reopening the app.

10. Risksb and Mitigation:-

10.1. Potential Risks

1. API Downtime:
    - Real-time features like currency conversion, stock profit calculations, and food calorie fetching rely on external APIs. API unavailability can impact app functionality.
2. Calculation Errors:
    - Financial, tax, and scientific calculations must be highly accurate to maintain user trust. Errors in formulas or logic could lead to incorrect results.
3. User Data Loss:
    - History of past calculations might be lost due to app crashes, accidental deletion, or device issues.
4. Performance Issues:
    - Heavy computations (e.g., scientific calculations, large history data) may slow down the app.
5. Security & Privacy Concerns:

- Users might be concerned about data privacy while using online services, such as currency conversion or stock calculations.

6. UI/UX Challenges:
    - A cluttered or non-intuitive design may confuse users, especially those unfamiliar with advanced calculations.

10.2. Mitigation Strategies

1. Ensuring API Reliability:
    - Implement backup APIs for critical services like currency exchange rates to ensure functionality even if the primary API fails.
    - Cache the last successful API response to enable offline mode for currency conversion.
2. Maintaining Calculation Accuracy:
    - Conduct thorough testing of all calculation modules, including unit tests and integration tests.
    - Regularly verify formulas and update them based on industry standards.
3. Preventing Data Loss:
    - Provide an option to export history as a file (CSV or PDF) for backup.
    - Implement cloud sync or local database storage to preserve history even after app restarts.
4. Optimizing App Performance:
    - Use efficient algorithms to handle large calculations without slowing down the app.
    - Implement lazy loading for history data to improve responsiveness.
5. Enhancing Security & Privacy:
    - Use secure connections (HTTPS) for API calls.

- Ensure no sensitive user data is stored or shared without consent.

6. Improving UI/UX:
    - Follow Material Design principles for a clean and easy-to-use interface.

11. Conclusion:-

The Calculator App is a comprehensive solution for users who require quick and accurate calculations across various domains, including standard arithmetic, EMI calculations, currency conversion, stock profit analysis, and unit conversions. Designed with user experience in mind, the app ensures accessibility, efficiency, and security through well-structured features and optimizations. With built-in data storage, robust security mechanisms, and real-time updates, users can rely on the app for precise and up-to-date financial computations. By addressing potential risks with effective mitigation strategies, the app guarantees reliability, accuracy, and ease of use. Future enhancements will further improve its functionality, making it an indispensable tool for everyday calculations.