**Title: EMI Calculator**

**Tool Details:**

* **Backend:** Express.js
* **Frontend:** WebComponent-based UI
* **Database (Optional):** JSON or in-memory storage
* **AI Integration:** Auto-generate test data for dynamic input validation

**Goal:**

By completing this assignment, candidates will learn how to:

* Develop and deploy a backend API using Express.js
* Create a WebComponent-based frontend and integrate it with the backend
* Implement real-time form handling and dynamic data processing
* Ensure seamless communication between frontend and backend using REST APIs

**Assignment Description:**

The EMI Calculator tool allows users to enter loan details (principal amount, interest rate, and tenure) into a form. The backend processes these inputs, applies the EMI formula, and returns the calculated monthly installment. The frontend dynamically displays the result upon receiving the response. AI-generated test cases ensure robustness.

**Tasks & Steps:**

**Backend API Development (Express.js)**

1. Set up an Express.js server and define a /calculate-emi POST endpoint.
2. Parse the request body to retrieve user inputs (principal, rate, tenure).
3. Implement the EMI calculation logic.
4. Send the computed EMI value as a JSON response.
5. Handle error cases (invalid input, missing parameters).

**Frontend (WebComponent-Based UI)**

1. Create a WebComponent with an interactive form (input fields for principal, rate, and tenure).
2. Capture form submission and send a request to the backend using Fetch API.
3. Parse the API response and update the UI to display the EMI result.
4. Ensure responsive and accessible UI design.

**Integration & Result Display**

1. Connect frontend and backend for seamless data flow.
2. Validate input fields dynamically and provide user-friendly feedback.
3. Display the calculated EMI prominently within the WebComponent.

**Mathematical Calculation:**

* EMI Formula: EMI=P×R×(1+R)N(1+R)N−1EMI = \frac{P \times R \times (1+R)^N}{(1+R)^N - 1} Where:
  + **P** = Principal loan amount
  + **R** = Monthly interest rate (Annual Rate / 12 / 100)
  + **N** = Loan tenure in months

**Third-Party Packages (if required):**

* express (for backend server)
* body-parser (for handling JSON input)
* cors (for cross-origin requests)

**Acceptance Criteria:**

* The backend should successfully receive input and return the correct EMI calculation.
* The WebComponent frontend should correctly display the calculated EMI upon form submission.
* Error handling should provide meaningful feedback for invalid inputs.
* The API response should be in JSON format and accessible to the frontend.
* AI-generated test cases should validate various loan scenarios.

**Submission Guidelines:**

1. Fork the provided GitHub repository.
2. Create a new folder named {your-name}-emi-calculator.
3. Implement the backend (Express.js) and frontend (WebComponent) within the folder.
4. Ensure proper folder structure and code documentation.
5. Push your solution and submit a pull request for review.

**Reference:**

1. [**https://www.calculator.net/**](https://www.calculator.net/)