Validation & Test Scenarios

Version: v36 (Secure Client Edition)

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Test Suite 1: Withdrawal Sequencing

- **Test 1.1: Tax-Efficient Path.** Verify the engine exhausts "Taxable" and "Cash" buckets before touching "Tax-Deferred" or "Roth" assets.
- **Test 1.2: Roth First.** Verify "Roth" balances are depleted first to cover deficits, resulting in lower "Total Tax" in early retirement years.

Test Suite 2: Tax Accuracy

- **Test 2.1: NC Social Security Exemption.** Verify that when "NC" is selected, the state tax amount does not increase when Social Security benefits begin.
- **Test 2.2: Widow Shock.** Set Spouse Death Age to 75. Verify that at age 76, the "Standard Deduction" in the internal logic drops and the "Fed Tax Rate" increases for the same level of income.

Test Suite 3: Event & Portfolio Logic

- **Test 3.1: Home Sale Reinvestment.** Input a $500,000 home sale at age 70. Destination: "Portfolio." Verify the "End Balance" increases by the net proceeds after any annual deficit is covered.
- **Test 3.2: Portfolio Exhaustion.** Confirm that if assets hit $0, the "End Bal" remains $0 (no negative wealth) and the "Cash Gap" reflects the full un-met spending need.

Test Suite 4: UI & Security

- **Test 4.1: Login Gate.** Verify that the `app-container` remains at `opacity-0` until the login form is submitted.
- **Test 4.2: CSV Export.** Verify the filename format: