Algorithm for the Advanced Mathematics Solver

1. **Start**
2. Display the menu with options:
    1. Modular Exponentiation (a^b mod m)
    2. Solve Linear Congruence (ax ≡ b mod m)
    3. Continued Fraction Representation
    4. Exit
3. Ask the user to enter their choice (1, 2, 3, or 4).
4. If the user chooses **1 (Modular Exponentiation)**:
    - Ask the user to input the base a*a*, exponent b*b*, and modulus m*m*.
    - Compute abmod m*ab*mod*m* using the modular_exponentiation function.
    - Display the result.
5. If the user chooses **2 (Linear Congruence Solver)**:
    - Ask the user to input the coefficient a*a*, constant b*b*, and modulus m*m*.
    - Solve the congruence ax≡bmod m*ax*≡*b*mod*m* using the solve_linear_congruence function.
    - Display the solution.
6. If the user chooses **3 (Continued Fraction Representation)**:
    - Ask the user to input a real number x*x*.
    - Compute the continued fraction representation of x*x* using the continued_fraction function.
    - Convert the continued fraction to a rational approximation using the continued_fraction_to_rational function.
    - Display the continued fraction and its rational approximation.
7. If the user chooses **4 (Exit)**:
    - Print "Exiting Advanced Mathematics Solver. Goodbye!"
    - **Stop**
8. If the user enters an invalid choice:
    - Print "Invalid choice! Please select a valid option."
9. Repeat from step 2 until the user chooses to exit.

Flowchart for the Advanced Mathematics Solver