Design Algorithm for Floridian Tooth Records

1. **Start Program**
   * Display a welcome message: "Welcome to the Floridian Tooth Records."
   * Explain the purpose of the program to the user.
2. **Get Number of Family Members**
   * Prompt the user to enter the number of people in the family.
   * The user should enter a number between 1 and 6, inclusive, because the program can only record data for a maximum of six family members.
   * If the user enters a number outside this range, display an error message: "Invalid number of people, try again."
   * Continue prompting the user until they enter a valid number within the range.
   * Once a valid number is entered, store this as the number of family members.
3. **Initialize Data Structures**
   * Create an empty list to store each family member’s name.
   * Create an empty 3D array to store each family member’s teeth information:
     + Each family member will have two rows of teeth data:
       - The first row for upper teeth.
       - The second row for lower teeth.
     + Each row can store up to eight teeth, including missing teeth.
4. **Collect Family Data**
   * For each family member (from 1 up to the total number of family members):
     + Prompt the user to enter the name of the family member.
     + Store the entered name in the list of family names.
     + Collect Upper Teeth Data
       - Prompt the user to enter the upper teeth data for this family member as a string of letters.
       - Each letter represents a specific type of tooth:
         * "I" for Incisors
         * "B" for Bicuspids
         * "M" for Missing teeth
       - The user can enter up to eight letters. If more than eight characters are entered, display an error message: "Too many teeth, try again."
       - If the user enters a character that is not "I", "B", or "M", display an error message: "Invalid teeth types, try again."
       - Continue prompting the user until they enter a valid string with a maximum of eight letters, using only "I", "B", and "M."
       - Store the validated upper teeth data in the upper row of this family member’s entry in the 3D array.
     + Collect Lower Teeth Data
       - Prompt the user to enter the lower teeth data for this family member, following the same format as the upper teeth data.
       - Validate that the input contains only the allowed characters ("I", "B", or "M") and that the total number of teeth does not exceed eight.
       - If the input is invalid, display an appropriate error message and prompt the user to enter the data again.
       - Store the validated lower teeth data in the lower row of this family member’s entry in the 3D array.
5. **Display Menu Options and Main Loop**
   * Display the main menu options:
     + Print Records (P): Display the family’s dental records.
     + Extract Tooth (E): Remove a specific tooth from a family member’s records.
     + Report Root Canal Indices (R): Calculate and display root canal indices for the family.
     + Exit Program (X): Close the program.
   * Prompt the user to select an option.
   * Convert the user’s input to lowercase to make the input case-insensitive.

**Handle Menu Options**

1. (P) Print Records
   * Display each family member's name and their upper and lower teeth records with tooth positions.
2. (E) Extract Tooth
   * Prompt the user to select a family member by name, then choose the upper or lower row and specify the tooth position (1-8).
   * Validate each input, and if valid, mark the selected tooth as missing.
3. (R) Report Root Canal Indices
   * Count the total number of Incisors, Bicuspids, and Missing teeth for the whole family.
   * Use these counts in the equation I×x2+B×x−M=0I \times x^2 + B \times x - M = 0I×x2+B×x−M=0 to find the roots.
   * Display the root canal indices or indicate if there are no real roots.
4. (X) Exit Program
   * Display a farewell message and end the program.
5. **Supporting Functions**
   * Function to Get and Validate Teeth Row
     + Prompt the user for a row of teeth data.
     + Ensure the string contains only allowed characters ("I", "B", "M") and is no longer than eight characters.
     + If invalid, display an error and re-prompt.
     + Return the validated row of teeth.
   * Function to Count Specific Tooth Types
     + For a given row of teeth, count the occurrences of a specific tooth type (Incisors, Bicuspids, or Missing).
     + Return the count for the specified type.
   * Function to Calculate Root Canal Indices
     + Given the counts of Incisors, Bicuspids, and Missing teeth, calculate the roots of the quadratic equation.
     + Display the roots if they are real, or indicate no real roots if necessary.
   * Function to Find Family Member by Name
     + Search the list of family names to find a match for the entered name.
     + Return the index of the family member if found, or an indication that the name is invalid if not found.