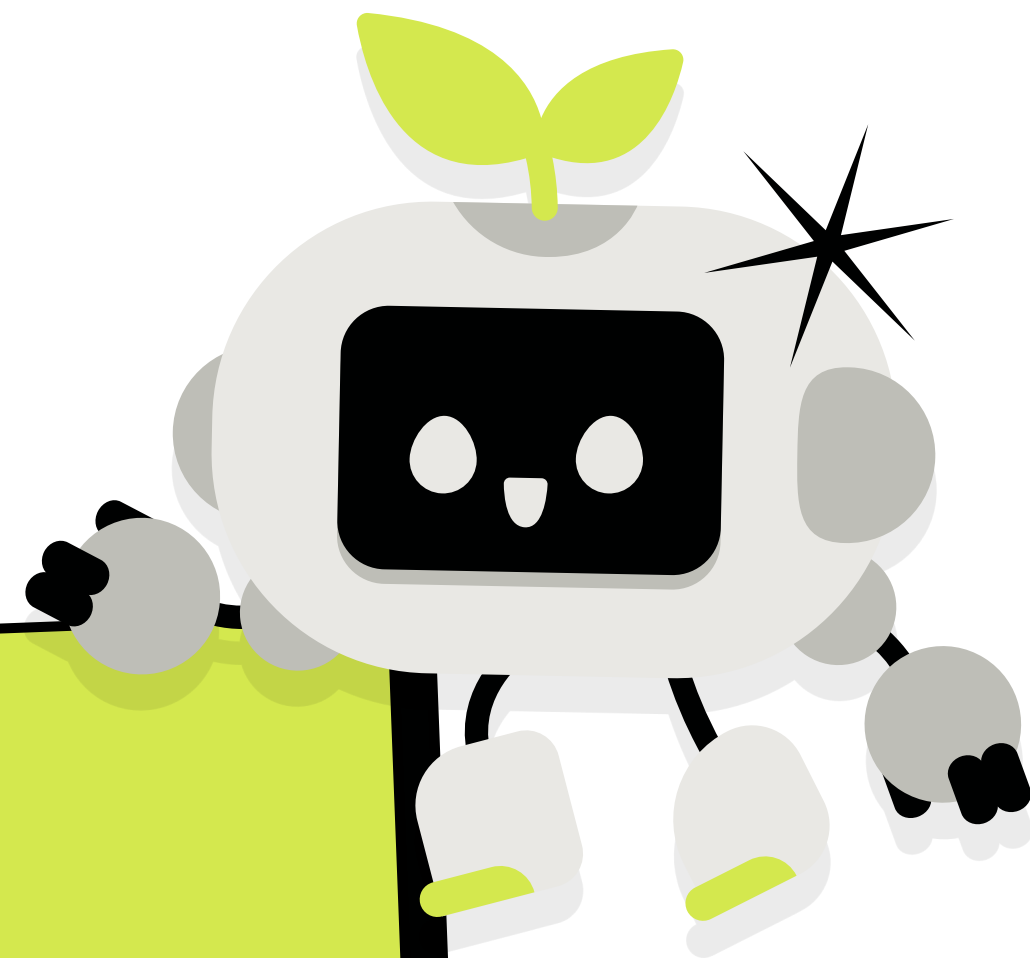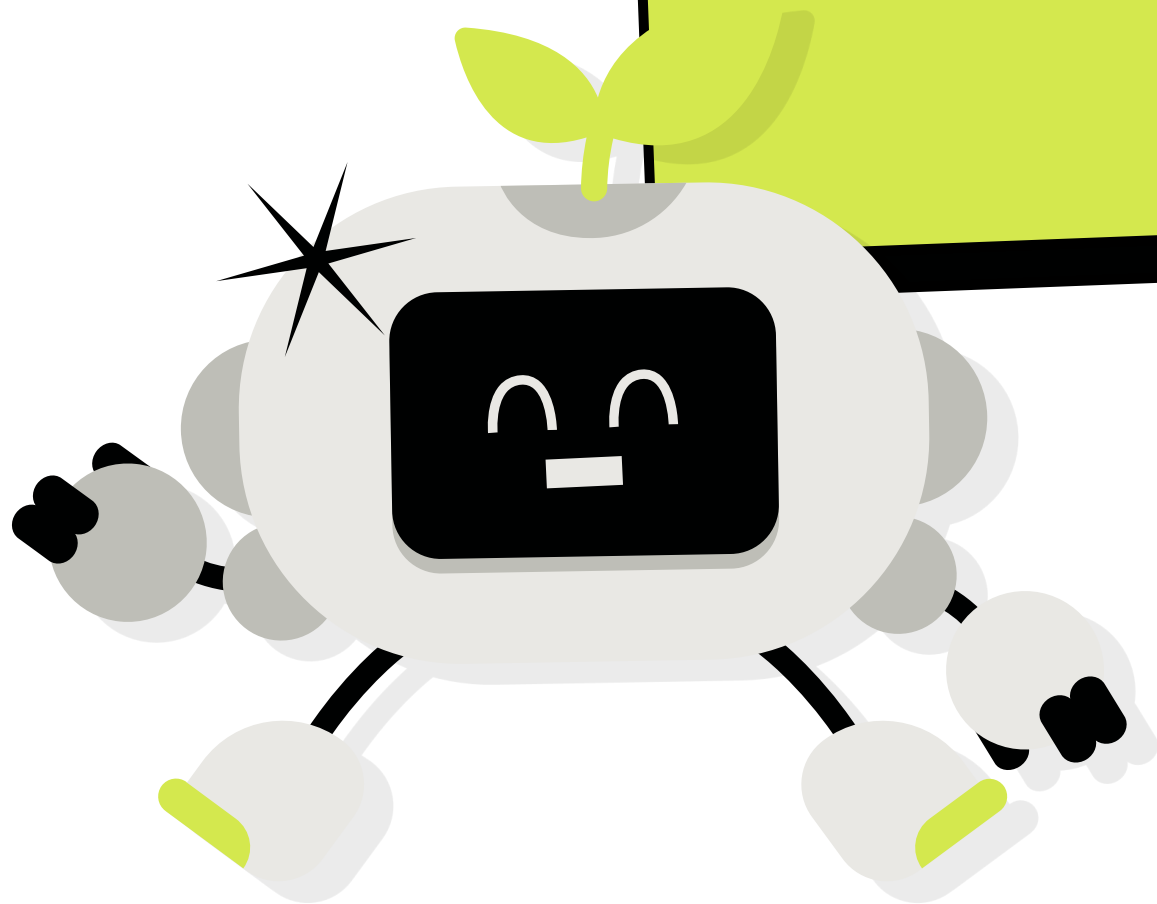# SUDOKU

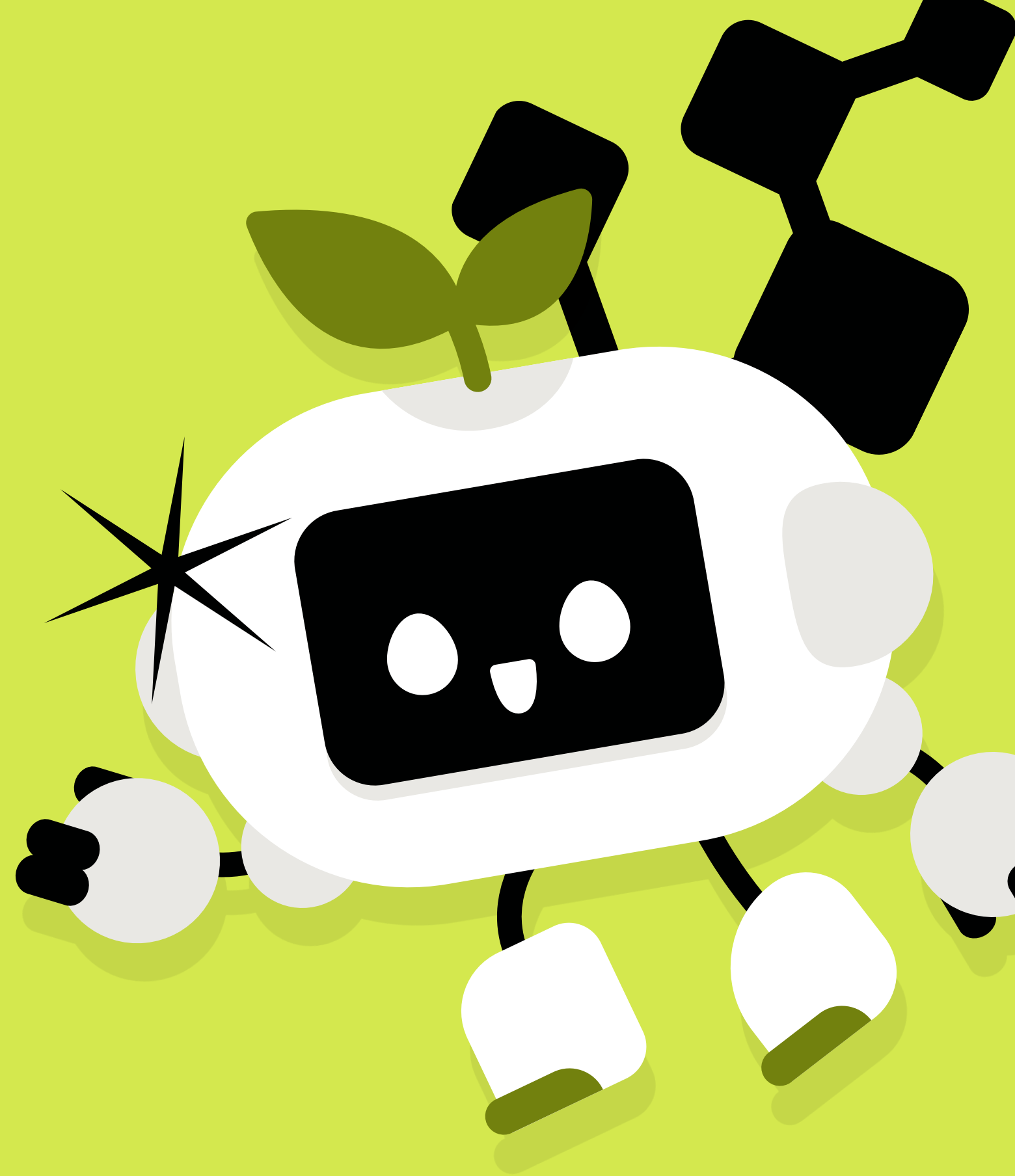## MASTER

OUR

TEAM

1. EIMAN FATIMA - 543105
2. ARHAM NABI   - 545094
3. MARYAM AMIR - 550843

MODULES/TASKS DIVISION

EIMAN FATIMA

1. Shuffle Array
2. Generate Puzzle
3. Difficulty levels
4. Remove Cells
5. Display grid formatting
6. Loss function
7. Display colored hints in the grid
8. PPT
9. Flow chart

ARHAM NABI

1. Input validation
2. Main menu
3. Game flow/loop
4. Integration of all modules
5. Debugging
6. Error handling
7. Win function
8. MP4 Video

MARYAM AMIR

1. User authentication
2. File management
3. Login/ Signup
4. Colored and other hints + feedback
5. Timer
6. Score calculation
7. Display grid (basic)
8. Report document

Sudoku puzzles are commonly solved by hand, which can be time consuming and error prone. Our game validates moves made by the user after each entry, making it a beginner friendly puzzle.
Colored hints help beginners to solve effectively in an engaging way.
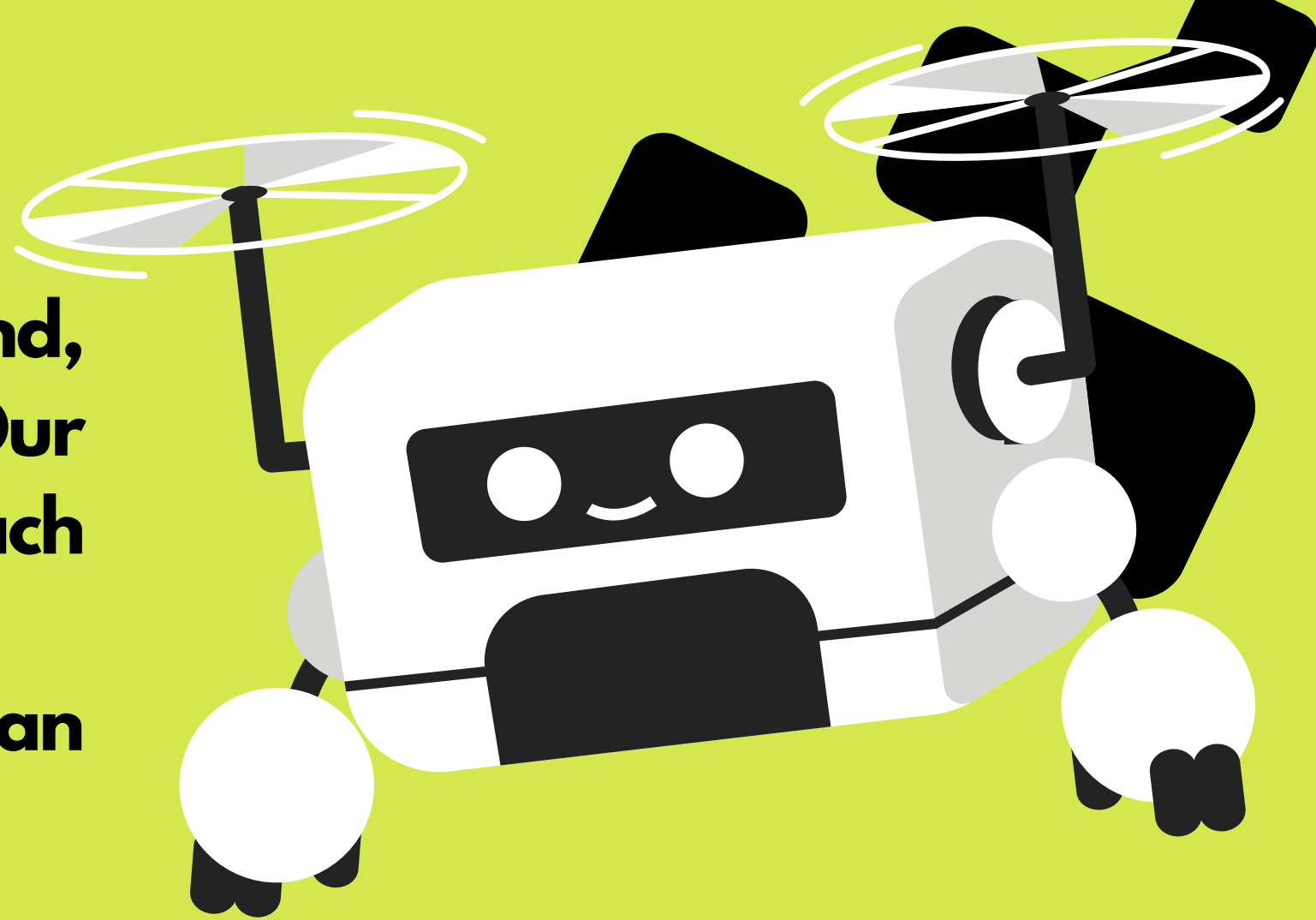
It generates puzzles automatically, following Sudoku constraints during gameplay, provides hints, and verifies the user's final solution through an automated solver.
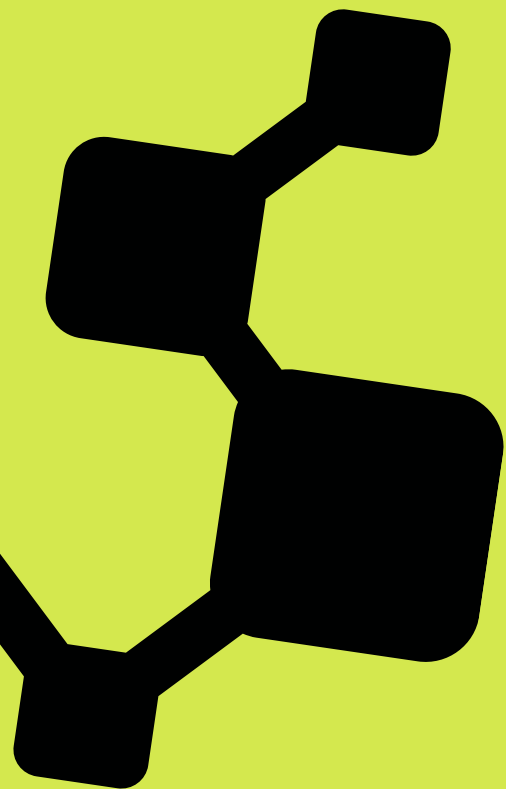
PROBLEM
STATEMENT
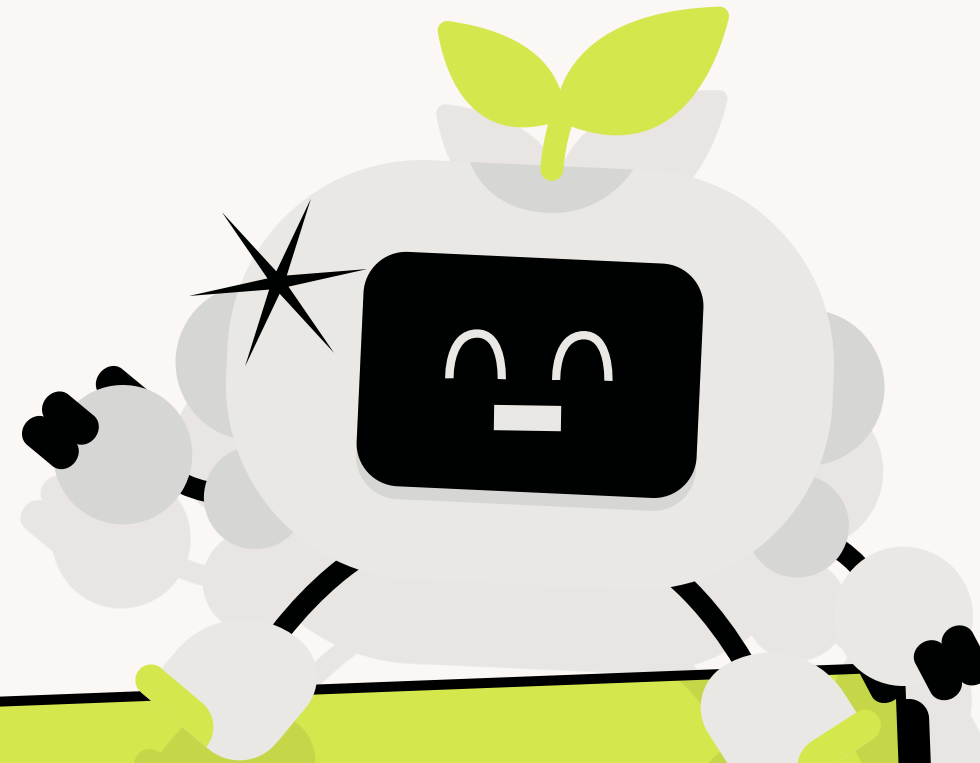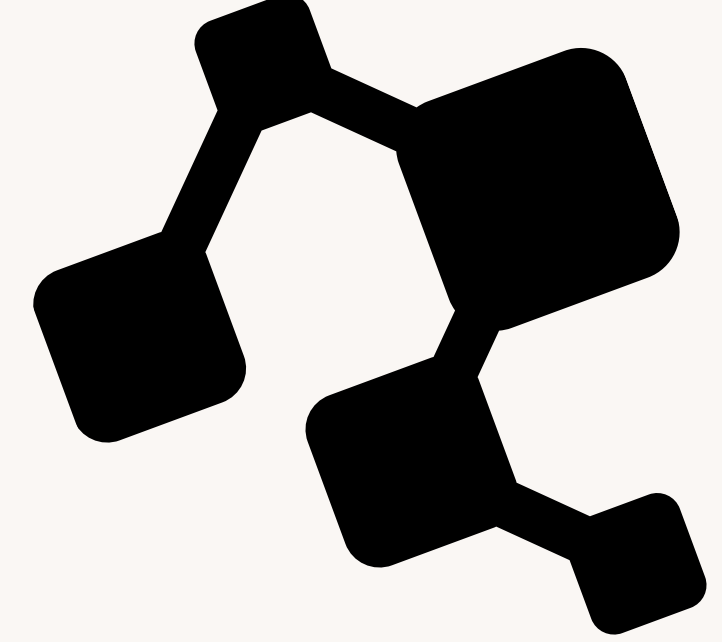
MODULES

MAJOR MODULES SCREENSHOTS
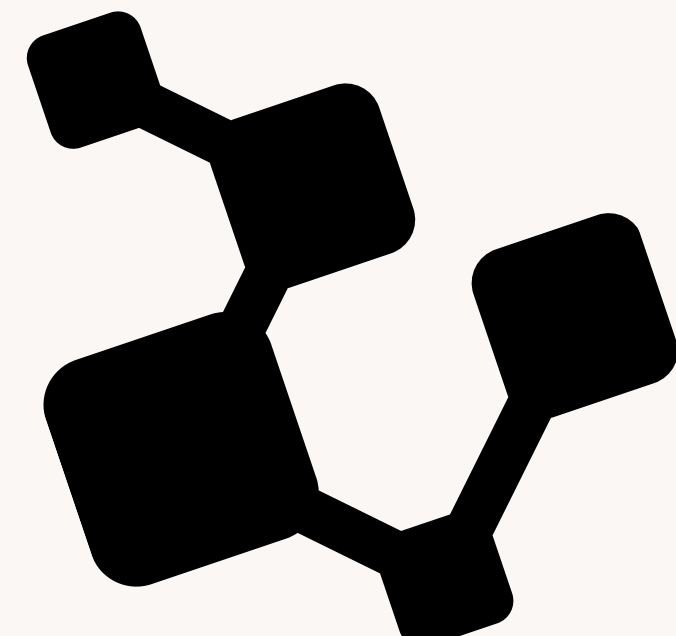
```
---------------- SIGN UP -----------------
Enter new username: demo
Enter password: 123
Signup successful!

Press Enter to continue...|
```

```
=========================================
        S U D O K U   M A S T E R
=========================================
---------------- LOGIN -----------------
Username: demo
Password: 1236
Incorrect password. Try again!
-----------------------------------------
Welcome  | Attempt #: 0
-----------------------------------------

Press Enter to continue...|
```
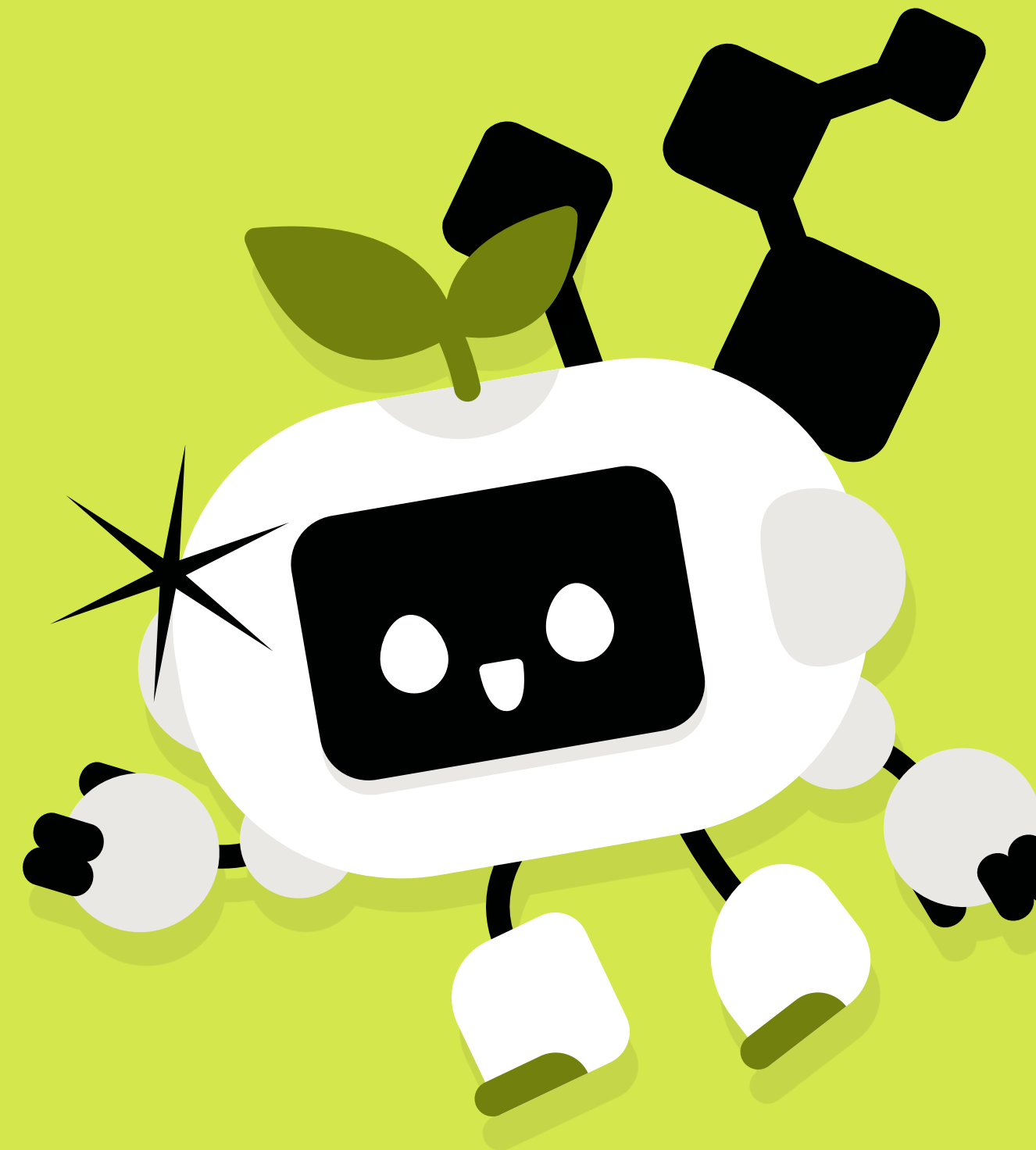
INSTRUCTIONS

```
------------- INSTRUCTIONS -------------
1. The goal is to fill a 9x9 grid with digits.
2. Each column, row, and 3x3 subgrid must contain
   digits 1-9.
------------- HOW TO PLAY -------------

1. DIFFICULTY LEVELS:
   - Easy:   100 Lives - 30 cells would be removed from the puzzle.
   - Medium: 35 Lives - 40 cells would be removed from the puzzle.
   - Hard:   20 Lives - 55 cells would be removed from the puzzle.

2. CONTROLS:
   - To play: Enter ROW space COL space VALUE
     (Example: '1 2 5' puts 5 in Row 1, Column 2)
   - Press 'h' for a Hint (Costs 100 pts)
   - Press 'q' to Quit game

3. FEEDBACK COLORS (What do they mean?):
   - Green:  Correct! The number belongs there.
   - Orange: Close! You are within 1 or 2 digits.
   - Red:    Far off. Try a completely different number.

4. SCORING & RULES:
   - You start with 1000 points.
   - Correct Move:  +25 Points
   - Invalid Move:  -50 Points & Lose 1 Life
   - Timer: Finish under 3 minutes! After that, -10 points per minute.
   - GAME OVER if Lives reach 0 or Score reaches 0.

Press Enter to continue...
```
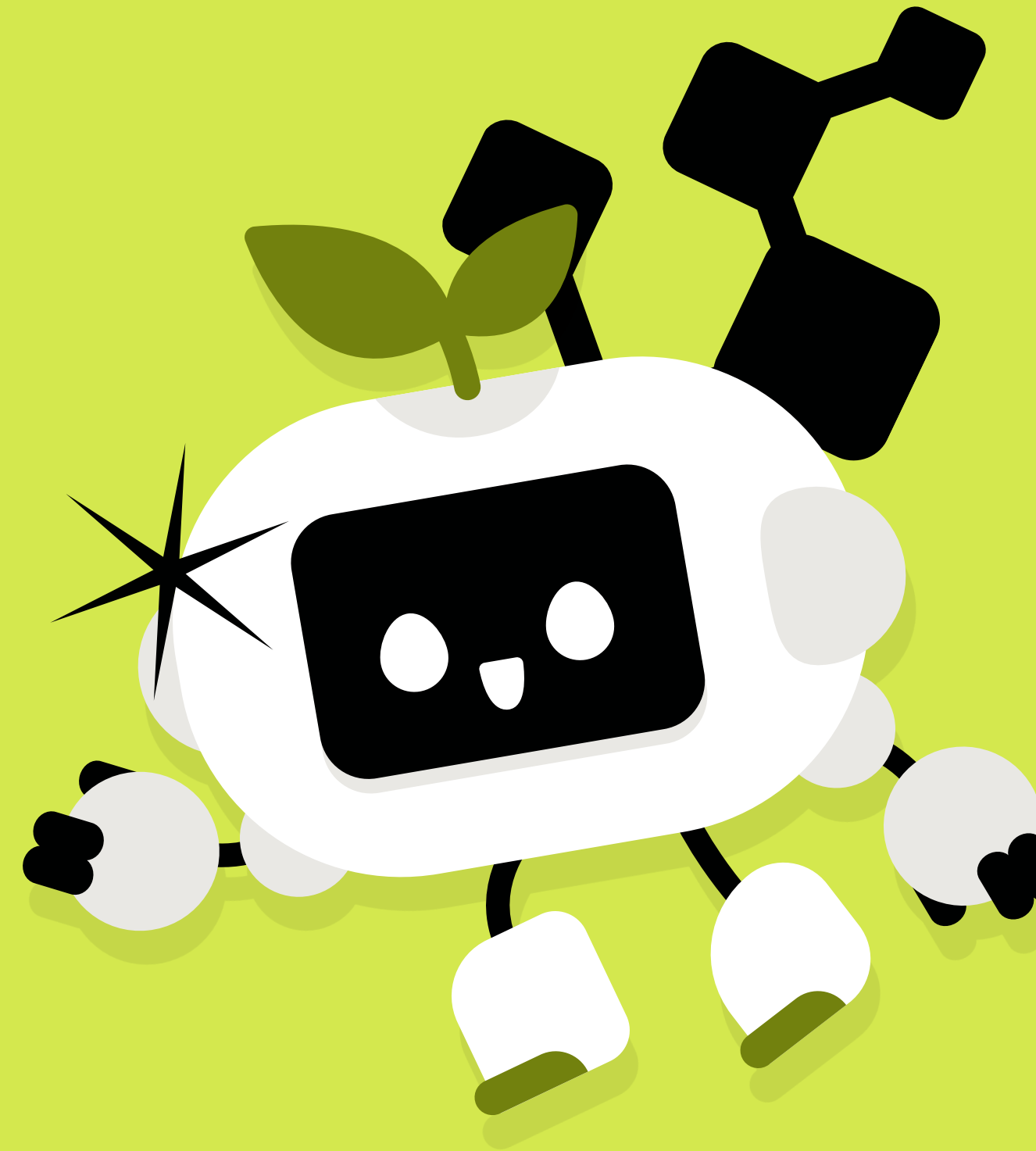
```
=========================================
       S U D O K U   M A S T E R
=========================================
User: demo

1. Start Game
2. Instructions
3. Logout
Enter choice: 1
Select difficulty level:
Type
1 for easy
2 for medium
3 for Hard
 1
```
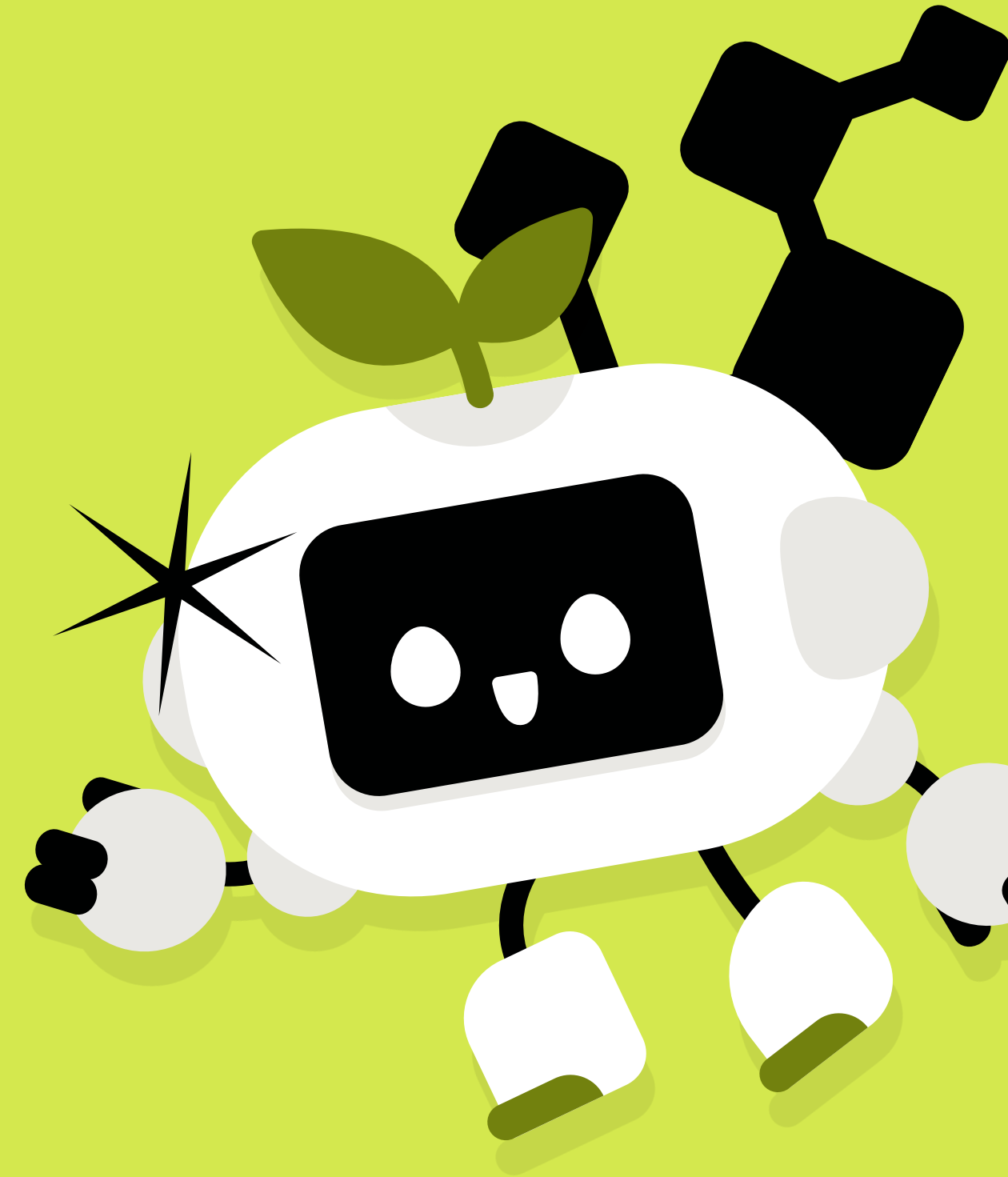
```
============================================
     S U D O K U   M A S T E R
============================================
     Lives: 100      Score: 1000

     --- CURRENT GAME GRID ---

       1 2 3   4 5 6   7 8 9
      +-------+-------+-------+
    1 | 5 1 . | 4 . 7 | . 9 . |
    2 | 2 6 9 | . 8 3 | . . . |
    3 | 3 4 . | 5 . 6 | 8 2 1 |
      +-------+-------+-------+
    4 | 6 9 . | . 3 . | 2 . 4 |
    5 | 1 3 . | 8 . 4 | 9 . . |
    6 | 8 7 . | 9 . 2 | . 1 . |
      +-------+-------+-------+
    7 | 7 . 3 | . 1 5 | . 6 9 |
    8 | 4 2 . | 6 . 9 | 5 3 8 |
    9 | 9 5 6 | 3 . . | 1 . 2 |
      +-------+-------+-------+


--------------------------------------------
Elapsed Time: 00:00:00
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit: |
```
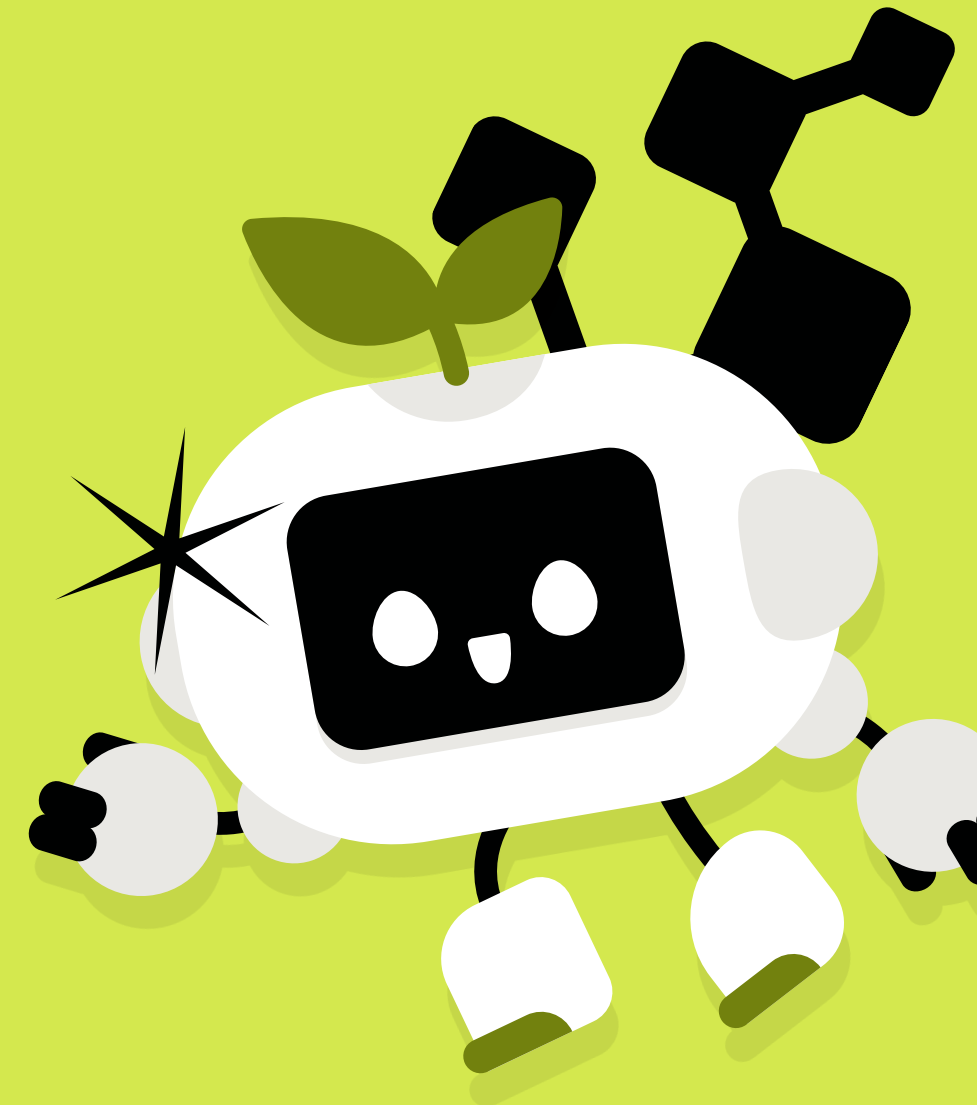
```
=========================================
    S U D O K U   M A S T E R
=========================================
    Lives: 100      Score: 690

    --- CURRENT GAME GRID ---

      1 2 3   4 5 6   7 8 9
    +-------+-------+-------+
  1 | 5 1 . | 4 . 7 | . 9 . |
  2 | 2 6 9 | . 8 3 | . . . |
  3 | 3 4 . | 5 . 6 | 8 2 1 |
    +-------+-------+-------+
  4 | 6 9 . | . 3 . | 2 . 4 |
  5 | 1 3 . | 8 . 4 | 9 . . |
  6 | 8 7 . | 9 . 2 | . 1 . |
    +-------+-------+-------+
  7 | 7 . 3 | . 1 5 | . 6 9 |
  8 | 4 2 . | 6 . 9 | 5 3 8 |
  9 | 9 5 6 | 3 . . | 1 . 2 |
    +-------+-------+-------+


------------------------------------------
Elapsed Time: 00:34:04
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit: 2 1 2
Locked cell! You cannot change this.
```
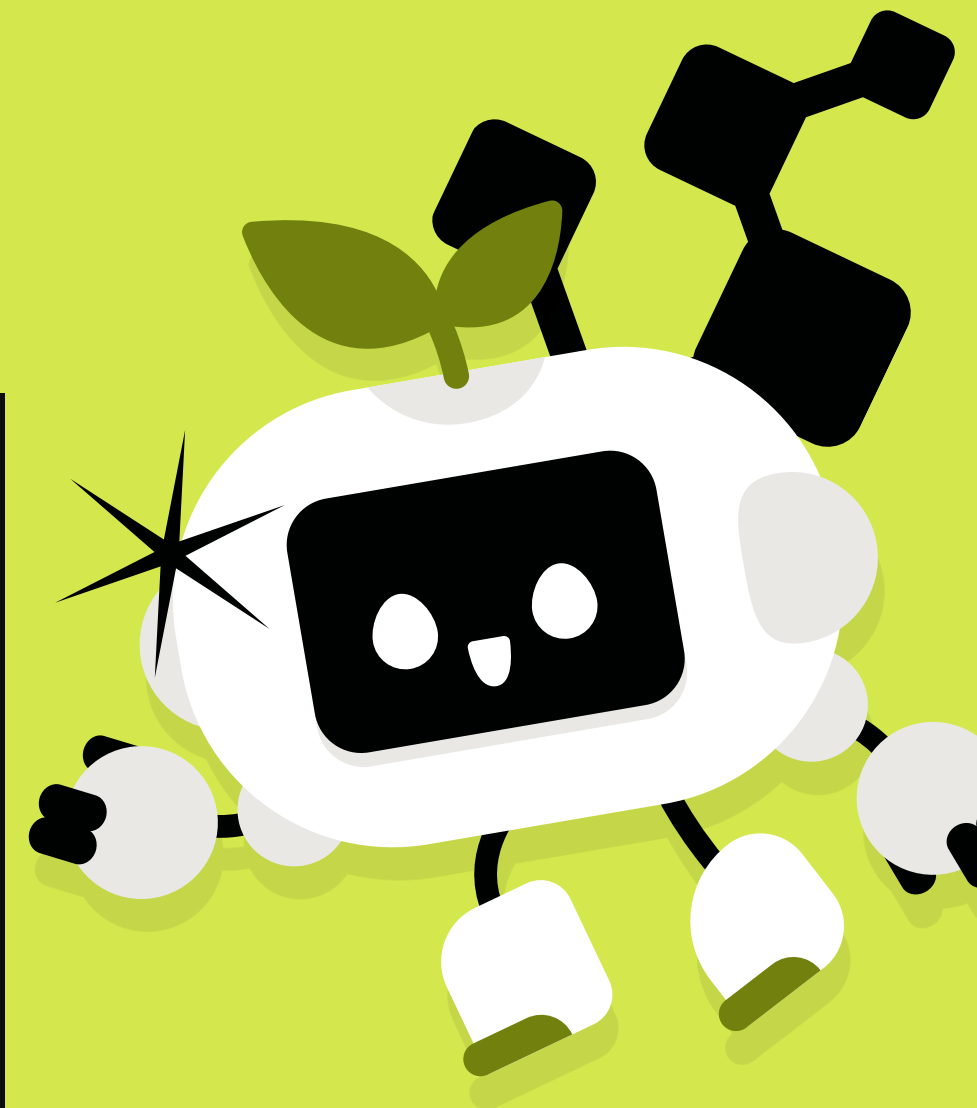
REVEAL CELL HINT

```
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit: h
     --- CURRENT GAME GRID ---

        1 2 3   4 5 6   7 8 9
      +-------+-------+-------+
    1 | 9 1 . | . . . | 2 . . |
    2 | . . . | . 2 . | . 9 . |
    3 | 8 6 2 | . 9 . | 5 . . |
      +-------+-------+-------+
    4 | 2 . . | 9 3 . | 6 . 5 |
    5 | . 5 9 | 6 7 1 | 4 2 . |
    6 | 7 8 . | . . 2 | 9 . 3 |
      +-------+-------+-------+
    7 | 1 7 5 | . 8 9 | 3 . 4 |
    8 | . . . | . 6 . | 1 . 2 |
    9 | . 2 3 | 5 . 4 | 7 . . |
      +-------+-------+-------+


-------------------------------------------
Revealed: The number at (7,1) is 1

Press Enter to continue...
```
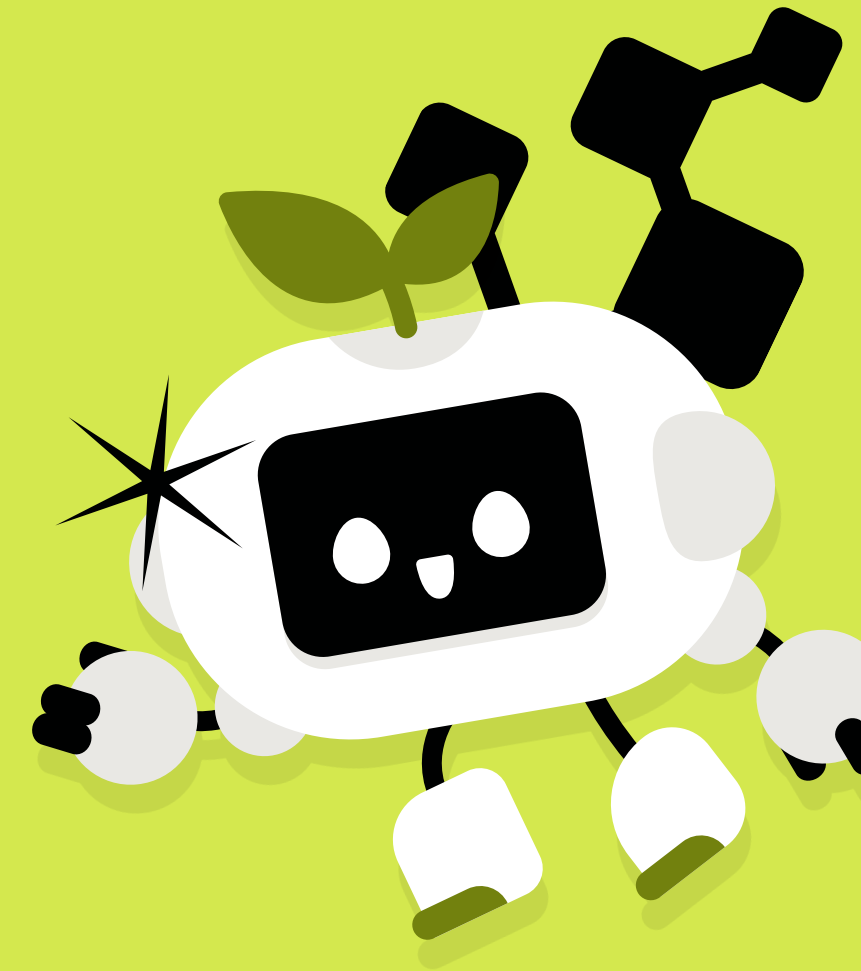
COLORED FEEDBACK

```
Feedback on your guess: 4
Far off! Try thinking about row, column, and box constraints.
        --- CURRENT GAME GRID ---

          1 2 3   4 5 6   7 8 9
        +-------+-------+-------+
      1 | 9 1 4 | . . . | 2 . . |
      2 | . . . | . 2 . | . 9 . |
      3 | 8 6 2 | . 9 . | 5 . . |
        +-------+-------+-------+
      4 | 2 . . | 9 3 . | 6 . 5 |
      5 | . 5 9 | 6 7 1 | 4 2 . |
      6 | 7 8 . | . . 2 | 9 . 3 |
        +-------+-------+-------+
      7 | 1 7 5 | . 8 9 | 3 . 4 |
      8 | . . . | . 6 . | 1 . 2 |
      9 | . 2 3 | 5 . 4 | 7 . . |
        +-------+-------+-------+
```
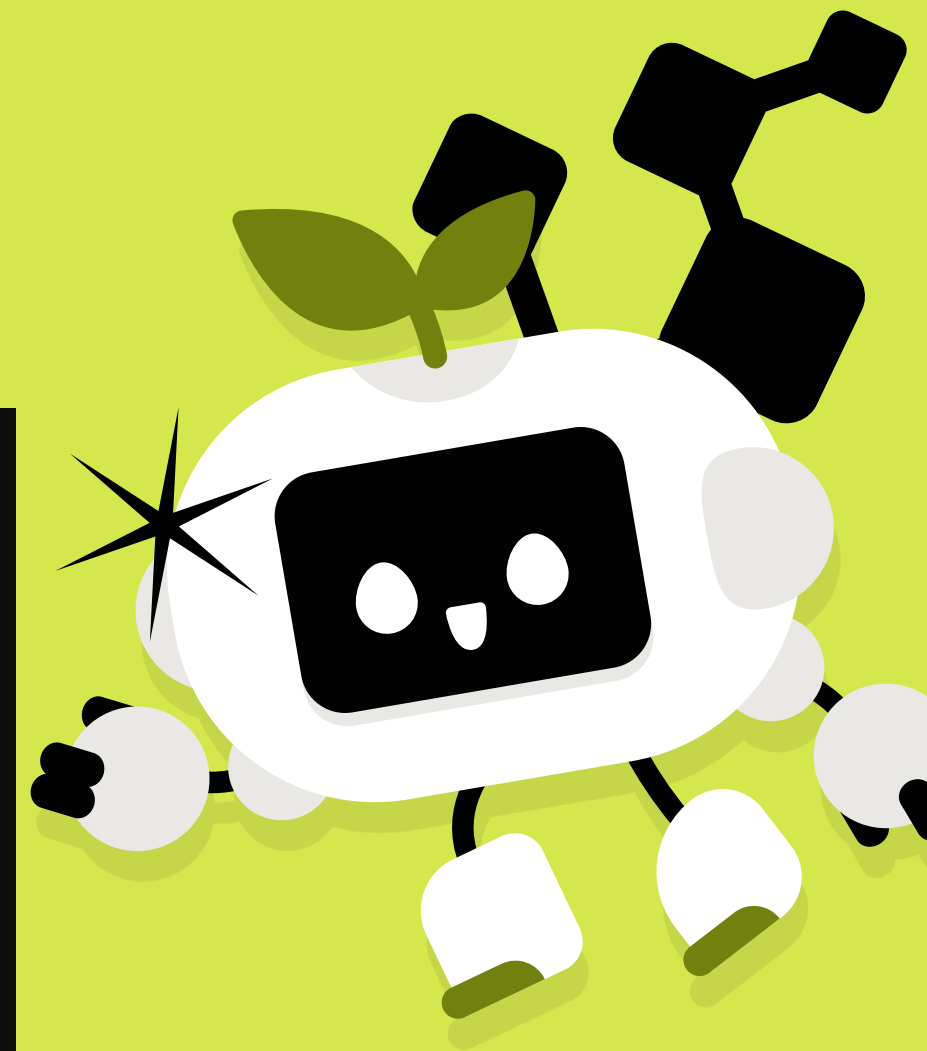
COLORED HINT
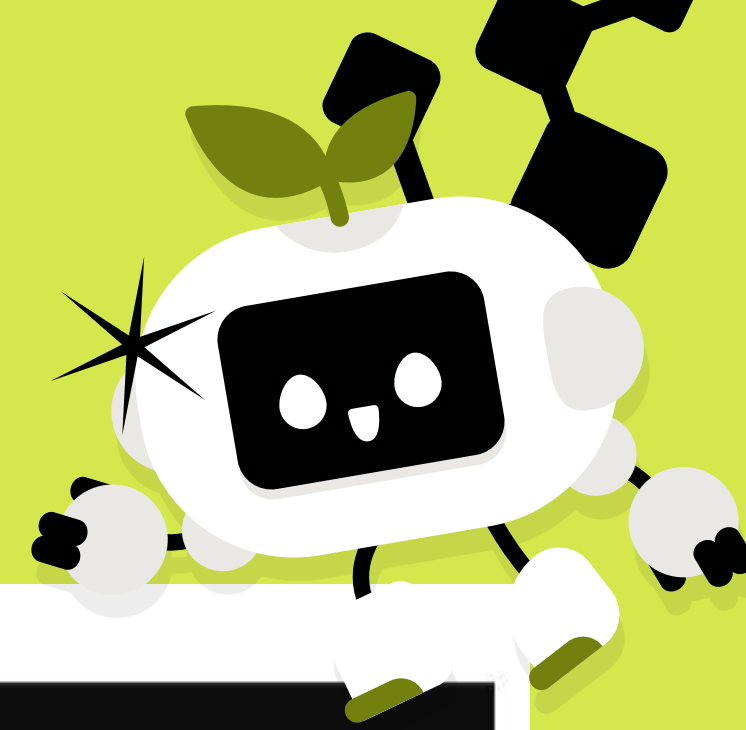
```
=====================================
      S U D O K U   M A S T E R
=====================================
    Lives: 97        Score: 365

    --- CURRENT GAME GRID ---

      1 2 3   4 5 6   7 8 9
    +-------+-------+-------+
  1 | 5 1 8 | 4 2 7 | 3 9 . |
  2 | 2 6 9 | 1 8 3 | 7 . . |
  3 | 3 4 7 | 5 9 6 | 8 2 1 |
    +-------+-------+-------+
  4 | 6 9 . | . 3 . | 2 . 4 |
  5 | 1 3 . | 8 . 4 | 9 . . |
  6 | 8 7 . | 9 . 2 | . 1 . |
    +-------+-------+-------+
  7 | 7 . 3 | . 1 5 | . 6 9 |
  8 | 4 2 . | 6 . 9 | 5 3 8 |
  9 | 9 5 6 | 3 . . | 1 . 2 |
    +-------+-------+-------+

---------------------------------------
Elapsed Time: 00:54:34
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit: 1 7 6
You updated your previous entry.
```

```
=====================================
      S U D O K U   M A S T E R
=====================================
    Lives: 97        Score: 355

    --- CURRENT GAME GRID ---

      1 2 3   4 5 6   7 8 9
    +-------+-------+-------+
  1 | 5 1 8 | 4 2 7 | 6 9 . |
  2 | 2 6 9 | 1 8 3 | 7 . . |
  3 | 3 4 7 | 5 9 6 | 8 2 1 |
    +-------+-------+-------+
  4 | 6 9 . | . 3 . | 2 . 4 |
  5 | 1 3 . | 8 . 4 | 9 . . |
  6 | 8 7 . | 9 . 2 | . 1 . |
    +-------+-------+-------+
  7 | 7 . 3 | . 1 5 | . 6 9 |
  8 | 4 2 . | 6 . 9 | 5 3 8 |
  9 | 9 5 6 | 3 . . | 1 . 2 |
    +-------+-------+-------+

---------------------------------------
Elapsed Time: 00:55:26
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit: |
```

- **Hint Feature Usage**

```
==========================================
      S U D O K U   M A S T E R
==========================================


      --- CURRENT GAME GRID ---

      1 2 3   4 5 6   7 8 9
    +-------+-------+-------+
  1 | 5 1 8 | 4 2 7 | 6 9 3 |
  2 | 2 6 9 | 1 8 3 | 7 4 5 |
  3 | 3 4 7 | 5 9 6 | 8 2 1 |
    +-------+-------+-------+
  4 | 6 9 5 | 7 3 1 | 2 8 4 |
  5 | 1 3 2 | 8 6 4 | 9 5 7 |
  6 | 8 7 4 | 9 5 2 | 3 1 6 |
    +-------+-------+-------+
  7 | 7 8 3 | 2 1 5 | 4 6 9 |
  8 | 4 2 1 | 6 7 9 | 5 3 8 |
  9 | 9 5 6 | 3 4 8 | 1 7 2 |
    +-------+-------+-------+


--------------------------------------
******************************************
      C O N G R A T U L A T I O N S !
******************************************
    You  solved  the  puzzle  in  01:10:22  seconds!
    With  a  score  of  705
******************************************
```

```
==========================================
      S U D O K U   M A S T E R
==========================================
      Lives: 100      Score: 1875

      --- CURRENT GAME GRID ---

      1 2 3   4 5 6   7 8 9
    +-------+-------+-------+
  1 | 2 3 4 | . 8 1 | . 5 . |
  2 | 9 5 8 | . 6 . | 2 . 1 |
  3 | 6 1 7 | . . . | 8 . 4 |
    +-------+-------+-------+
  4 | . 4 . | . . 2 | 6 8 . |
  5 | . 8 . | . 5 6 | 4 2 . |
  6 | 7 2 6 | . 4 9 | 3 1 5 |
    +-------+-------+-------+
  7 | 1 7 2 | 6 9 8 | . . . |
  8 | 8 9 3 | . . 4 | 1 6 2 |
  9 | 4 6 5 | 2 1 3 | . 7 . |
    +-------+-------+-------+

--------------------------------------
Elapsed Time: 00:00:49
Enter ROW (1-9) COL (1-9) VALUE (1-9), OR 'h' for Hint, OR 'q' to Quit:
q

Game Over!
Player: demo
Time: 00:01:04s

Press Enter to continue...
```

FLOW CHART

message

INPUT:
Choice (1,2,3)

Choice?

1

2

3

1. Start Game Setup:
Generate Full Grid

2. Show
instructions

3. EXIT

Difficulty Level
1,2 or 3?

1

2

3

Remove 30 cells

Remove 40 cells

Remove 55 cells

Copy solution

Start Timer

```
                          │
                          ▼
              ┌───────────────────┐
              │  Enter Game loop  │
              └───────────────────┘
                          │
                          ▼
              ┌───────────────────┐
              │ Display Full grid, │
              │    lives, score    │
              └───────────────────┘
                          │
                          ▼
                  ╱─────────────╲
                 ╱    INPUT:      ╲
                │  row, col, val   │◄──────────────┐
                 ╲ OR 'h' (hint)  ╱                │
                  ╲ OR 'q' (quit)╱                 │
                   ╲────────────╱                  │
                          │                        │
         ┌────────────────┼──────────────┐         │
         ▼                ▼              │         │
    ◇──────────◇    ◇─────────────◇      │         │
   ╱ "q" (quit)? ╲ ╱ Is input      ╲ NO  │         │
   ╲────────────╱  ╲  numeric?     ╱─────┼──────►  │
         │          ╲─────────────╱      │         │
        YES              │               ▼         │
         │              YES         ◇──────────◇   │
         ▼               │         ╱ "h" (hint)? ╲  │
   ┌──────────┐          ▼         ╲────────────╱   │
   │Show Stats│   ◇──────────────◇       │          │
   └──────────┘  ╱ Is row, col    ╲ NO   YES        │
                 ╲    valid?      ╱──────┼──►        │
                  ╲──────────────╱       ▼           │
                         │        ┌──────────────┐   │
                        YES       │  Score - 100 │   │
                         │        └──────────────┘   │
                         ▼               │           │
               ◇──────────────◇          ▼           │
  ┌─────────────┐ ╱ Is cell     ╲ ┌──────────────────┐
  │Error message│◄─╲  locked?   ╱  │Reveal random box │
  └─────────────┘YES╲──────────╱   └──────────────────┘
                         │
                        NO
```
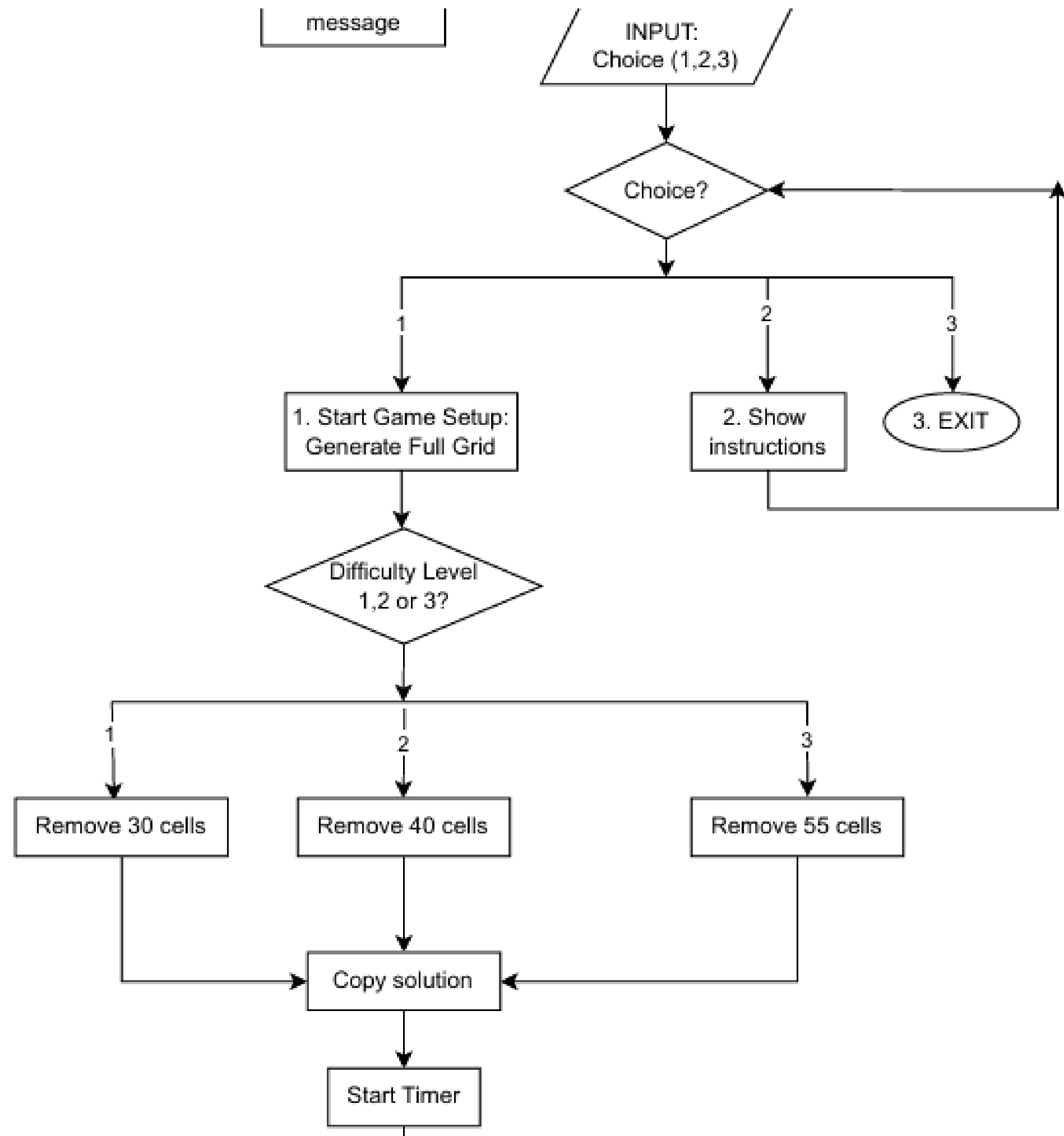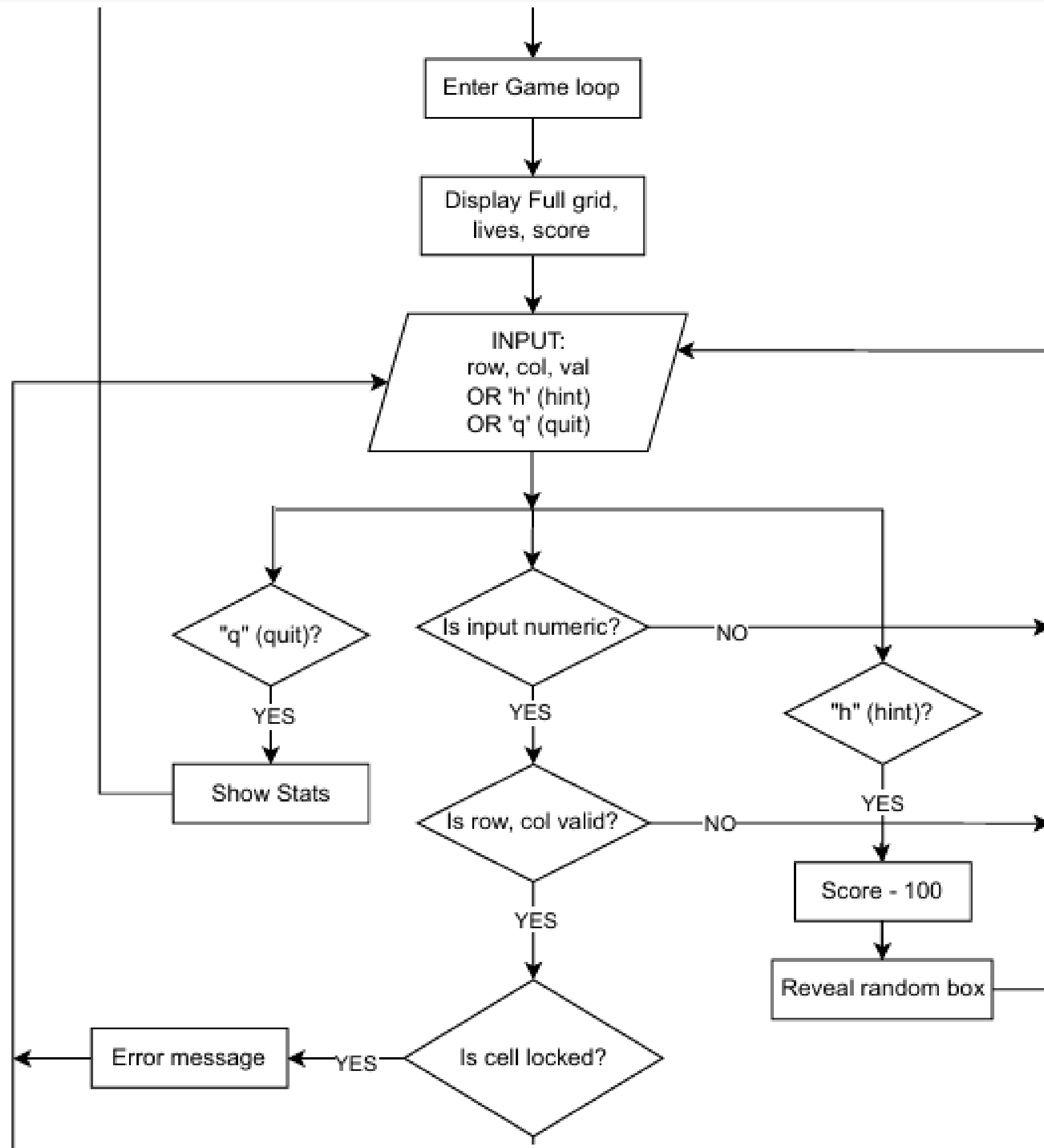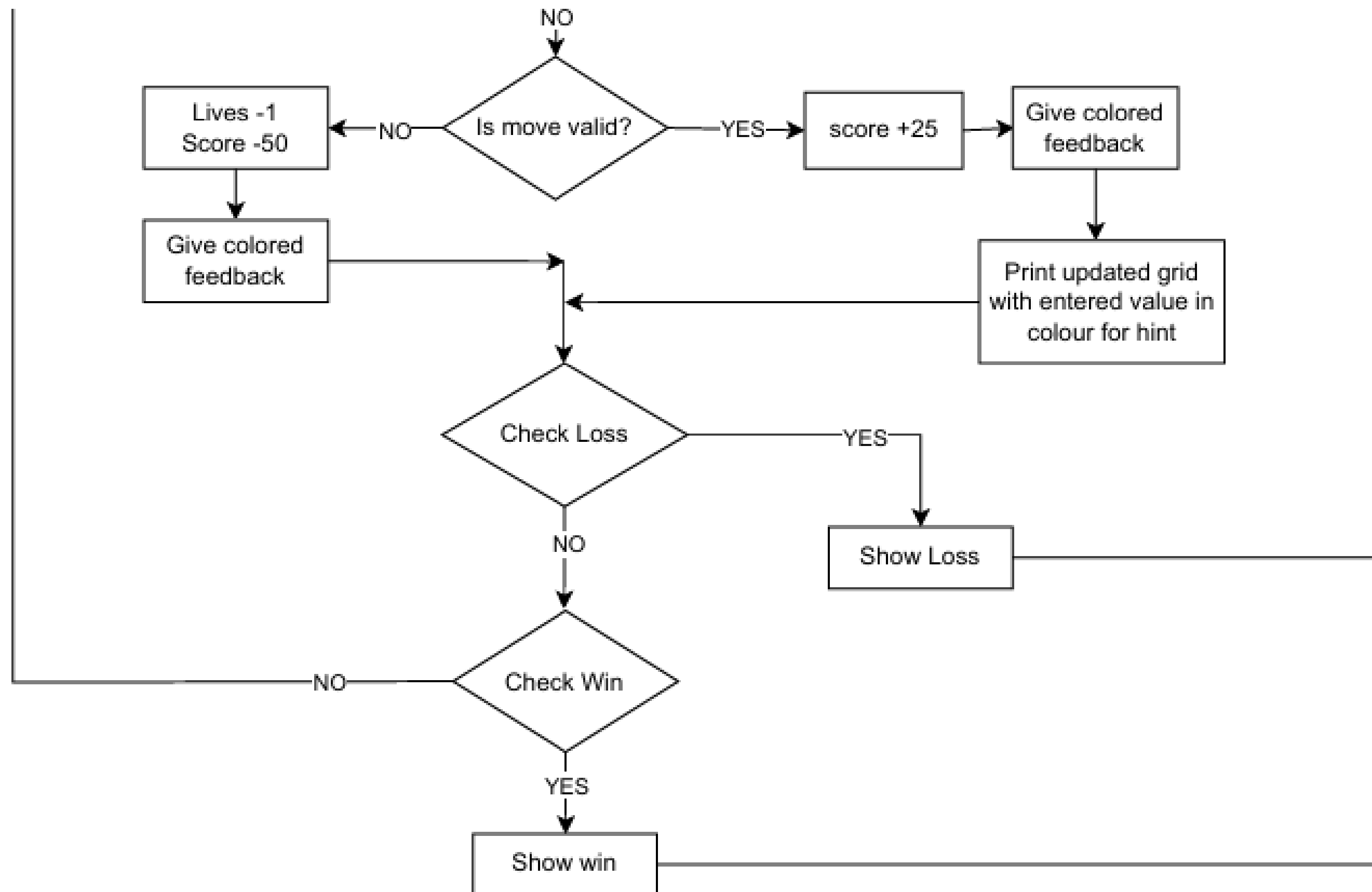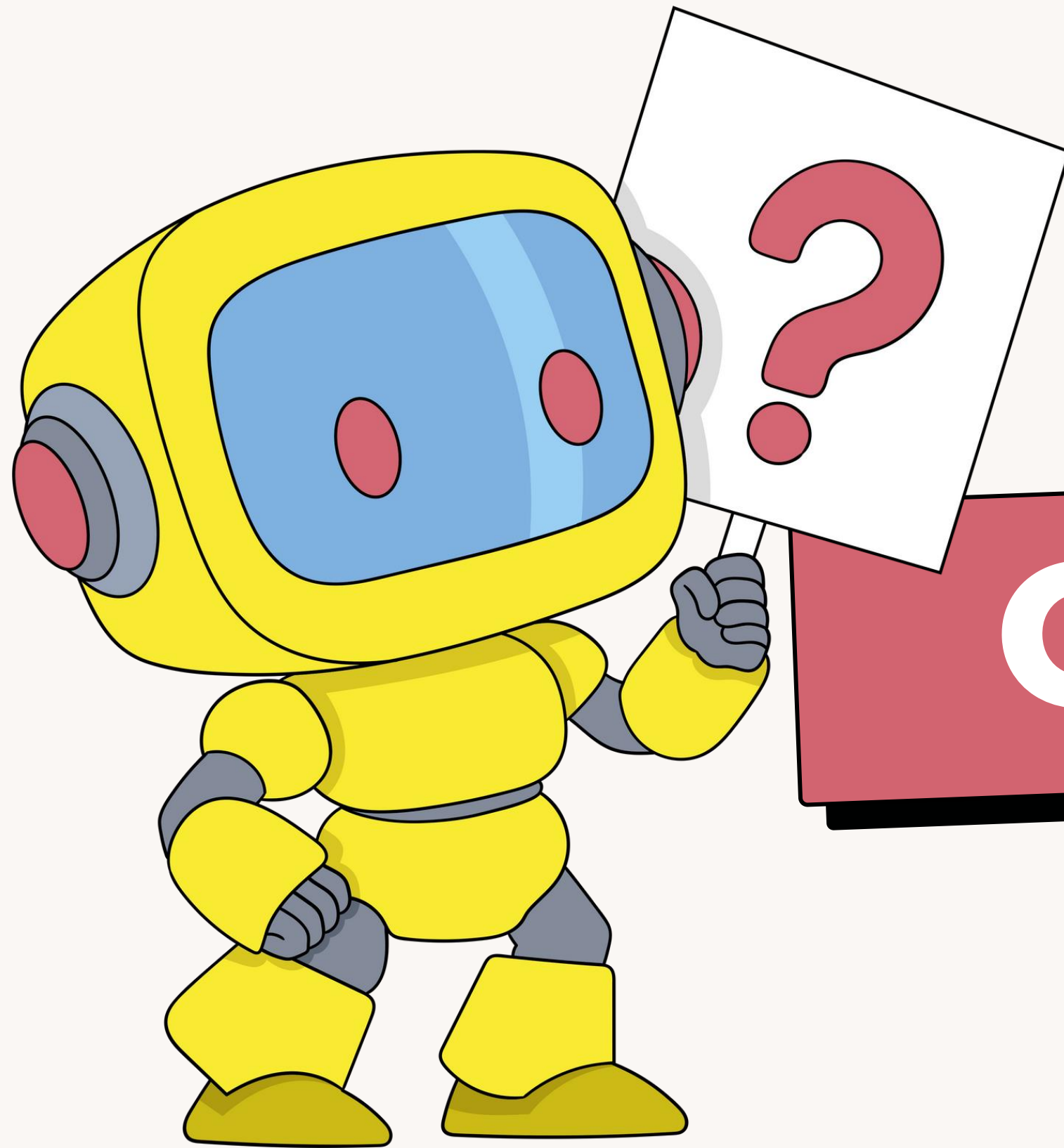
THANK YOU

QUESTIONS