2. Challenge Questions with Algorithmic Explanation

Stack Challenge: Push ["A", "B", "C"], pop all, then push "D". Which is top?

**Algorithm Steps:**

1. Initialize empty stack.
2. Push "A", "B", "C".
3. Pop all → removes "C", then "B", then "A".
4. Push "D".
5. Top of stack is "D".

Queue Challenge: Queue vs Stack for boarding buses. Which matches reality?

**Algorithmic Comparison:**

- **Queue (FIFO):**
  - People arrive and board in the order they came.
  - Matches reality at bus stops.
- **Stack (LIFO):**

- Last person to arrive boards first.
- Unrealistic for public transport.

. Reflection Questions (Theory Only)

Why stack cannot ensure fairness in queues?

Stacks follow **LIFO** (Last In, First Out). This means the most recent arrival gets served first, while earlier ones wait longer. In systems like hospitals or customer service, this is unfair because it ignores arrival time and priority.

Why FIFO ensures fairness in transport?

Queues follow **FIFO** (First In, First Out), meaning passengers are served in the order they arrive. This ensures:

- Equal opportunity
- Predictable service
- Respect for waiting time

In transport, FIFO prevents chaos and promotes orderly boarding.