**The "Complement Pattern"**

The key insight is **trading space for time** using the **complement lookup pattern**:

Instead of: "For each element, check ALL other elements"

Think: "For each element, check if its COMPLEMENT already exists"

**When to Apply This Pattern**

Look for these **problem characteristics**:

**🎯 Target-Based Problems**

* Problems involving sums, differences, or relationships between pairs
* Keywords: "target sum", "pair that equals", "two numbers that..."

**🔄 Nested Loop Scenarios**

* When you find yourself writing for i... for j...
* Especially when the inner loop searches for something specific

**📊 Lookup-Heavy Operations**

* When you repeatedly ask: "Does X exist in this collection?"
* When you need to find previous elements that satisfy a condition