Tips for Sliding Window

Core Structure

1. Window Expansion

- Usually book-keep (add in) a newly seen element.

2. Window Repair (when window invariant/contract breaks)

- If newly seen element breaks invariant (e.g. introduces duplicate), shrink (usually) the left pointer.

3. Answer/Result Update

- (usually) Do this when invariant holds.

Summary:

Sliding window has a process of

```
Expand right → repair by moving left → read answer when valid
```

Caveat: It's not Universal

- **Test:** ask "When my window becomes invalid, can i *always fix it* by moving the left pointer forward?"
  - If yes, sliding window applies

Requirements for Applying This Structure

1. **The Window can be defined, and it is contiguous**

- if the interval `[l...r]` cannot be difined, no sliding window

2. **State can be updated incrementally**

- Ensure the following capabilities:
  - adding one element
  - removing one element
  - maintain validity in $O(1)$ or amortized $O(1)$