Find Minimum in Rotated Sorted Array

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1. The Mental Model

A rotated sorted array isn't just a random mix. It is Two Sorted Slopes separated by a drop.

- Left Slope: High numbers (e.g., 4, 5, 6)
- Right Slope: Low numbers (e.g., 1, 2, 3)
- The Goal: Find the start of the Right Slope.

2. The Golden Rule

Compare Mid vs. End

Never compare mid vs. start. It is unreliable because the rotation might start at start. Always compare against the Rightmost element.

DECISION LOGIC:

1. If nums[mid] > nums[end]:
   - Meaning: mid is part of the left slope (High)
   - Implication: The min is somewhere to the Right.
   - Action: start = mid + 1 (we can safely discard mid).

2. If nums[mid] <= nums[end]:
   - Meaning: mid is part of the Right Slope (Low).
   - Implication: The min is either at mid or to the Left.

3. The "Trap" (Why end = mid?)

You will be tempted to write end = mid - 1. Don't!

- Scenario: [3, 1, 2]
- mid is 1
- check: 1 <= 2 (True)
- If you do end = mid - 1: You set end to Index 0 i.e 3.

  You just threw away the 1 (the answer)!
- If you do end = mid: You keep the 1 in the search space.

4. Summary

- Complexity: O(log n)
- loop: while start < end
- move Right: start = mid + 1
- move Left: end = mid
- final ans: nums[start]