

Two Sum II - Input array

For this problem we must find two indices (1-indexed) such that $\text{numbers}[i] + \text{numbers}[j] == \text{target}$, using $O(1)$ extra space.

Approach: Two Pointers:

- Why it works:
- Array is sorted \rightarrow we can use two pointers (one at start, one at end).
 - If sum is less than target \rightarrow move left pointer right.
 - If sum is greater than target \rightarrow move right pointer left.
 - If sum equals target \rightarrow return indices.

Algorithm:

1. Initialize $\text{left} = 0$, $\text{right} = \text{numbers.size()} - 1$.
2. While $\text{left} < \text{right}$:
 - $\text{sum} = \text{numbers}[\text{left}] + \text{numbers}[\text{right}]$
 - If $\text{sum} == \text{target}$: return $[\text{left} + 1, \text{right} + 1]$ (1-indexed)
 - If $\text{sum} < \text{target}$: $\text{left}++$
 - Else $\text{right}--$

Complexity:

- Time: $O(n)$ (single pass)
- Space: $O(1)$ (constant extra space)