# 1 Tricky Transformations

| Problem | Pattern | Trick | TC | SC |
| --- | --- | --- | --- | --- |
| Next Permutation | Find first decreasing from end | Reverse suffix | O(n) | O(1) |
| Sort Colors | Dutch National Flag | Three pointers: low/mid/high | O(n) | O(1) |
| Set Mismatch | Cyclic sort | Place x at index x-1 | O(n) | O(1) |

# 2 2D Matrix Basics

| Problem | Pattern | Trick | TC | SC |
| --- | --- | --- | --- | --- |
| Set Matrix Zeroes | Use first row/col as marker | O(1) space | O(mn) | O(1) |
| Spiral Matrix | Boundary traversal | top, bottom, left, right pointers | O(mn) | O(1) |

# 3 Rotation & Merge

| Problem | Pattern | Trick | TC | SC |
| --- | --- | --- | --- | --- |
| Rotate Image | Transpose + reverse rows | In-place rotation | $O(n^2)$ | O(1) |
| Merge Sorted Arrays | Two pointers from end | Avoid extra space | O(n+m) | O(1) |

# 4 Greedy / Stock Problems

| Problem | Pattern | Trick | TC | SC |
| --- | --- | --- | --- | --- |
| Best Time to Buy/Sell | Track min price | maxProfit = max(maxProfit, price-minPrice) | O(n) | O(1) |
| Max Consecutive Ones | Sliding window | Expand/shrink for 0 flips | O(n) | O(1) |

# 5 Advanced Patterns

| Problem | Pattern | Trick | TC | SC |
|---|---|---|---|---|
| Sliding Window Maximum | Deque | Max at front | O(n) | O(n) |
| Longest Consecutive Sequence | HashSet | Only start at x-1 not in set | O(n) | O(n) |
| First Missing Positive | Cyclic sort | Place x at index x-1 | O(n) | O(1) |
| Maximum Circular Subarray | Kadane + total-minKadane | max(normal, total-min) | O(n) | O(1) |

# Memory Sentences

1. Next Permutation → Find first decreasing → reverse suffix
2. Sort Colors / Set Mismatch → Cyclic sort / 3-pointer
3. Matrix → Use boundaries / markers
4. Stock / Sliding Window → Track min/max or window size
5. Circular subarray → max(normal, total-min)
6. First Missing Positive → Place each number at index = value-1