Matrix Algorithms — Illustrated Guide
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Included Problems
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1) Search in Sorted Matrix — top-right staircase, O(m+n), O(1) space.
2) Rotate Image 90° — transpose then reverse each row, O(n^2) time, O(1) extra.
3) Flood Fill — DFS/BFS recolor of 4-connected region, O(m*n) time.
4) Spiral Order — layer traversal with (top,bottom,left,right) bounds, O(m*n).
5) Set Matrix Zeroes — use first row/col as markers, O(1) extra space.

Key Patterns

- Boundary/bounds technique for layered traversals (spiral).
- In-place transforms via transpose + reverse for rotations.
- Marker rows/columns for constant-space matrix writes.
- DFS/BFS for grid connectivity problems (flood fill, islands).

Complexities (m x n matrix)

- Search Sorted: O(m + n) time, O(1) space
- Rotate Image: O(n^2) time, O(1) space
- Flood Fill: O(m*n) time, O(m*n) recursion worst
- Spiral Order: O(m*n) time, O(1) space
- Set Zeroes: O(m*n) time, O(1) space