Graph Algorithm Cheat Sheet

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Graph DSA Interview Cheatsheets

Quick Reference Table

Problem Type	Use This Algorithm
Detect cycle (undirected)	Union-Find, DFS
Detect cycle (directed)	DFS with recursion stack
Count islands / components	DFS / BFS
Shortest path (unweighted)	BFS
Shortest path (positive weights)	Dijkstra
Shortest path (with negative weights)	Bellman-Ford
All-pairs shortest paths	Floyd-Warshall

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Problem Type	Use This Algorithm
Task scheduling with dependencies	Topological Sort
Minimum spanning tree	Kruskal / Prim

🔹 1. Union-Find (Disjoint Set Union - DSU)

Use When:

- Detecting cycles in undirected graphs
- Counting connected components
- Building MSTs with Kruskal's Algorithm

Look for Keywords:

- "Extra edge"
- "Make a tree"
- "Connected groups"

Common Problems:

- Redundant Connection
- Number of Provinces
- Accounts Merge

🔹 2. Breadth-First Search (BFS)

Use When:

- Shortest path in unweighted graphs
- Level-by-level processing
- Multi-source propagation

Look for Keywords:

- "Minimum steps"
- "Spread from source"
- "Fewest moves"

Common Problems:

- Word Ladder
- Rotten Oranges
- 01 Matrix

🔹 3. Depth-First Search (DFS)

Use When:

- Exploring all paths
- Cycle detection (directed graphs)
- Connected components

Look for Keywords:

- "Explore all"
- "Count regions/islands"
- "Deadlock / Circular dependency"

Common Problems:

- Number of Islands
- Pacific Atlantic Water Flow
- Course Schedule

🔹 4. Topological Sort (Kahn's or DFS)

Use When:

- Task ordering with dependencies
- Detecting cycles in DAGs

Look for Keywords:

- "Finish all tasks"
- "Prerequisites"
- "Build order"

Common Problems:

- Course Schedule I & II
- Alien Dictionary

🔹 5. Dijkstra's Algorithm

Use When:

- Shortest path in weighted graphs with **positive weights**

Look for Keywords:

- "Minimum time/cost"
- "Fastest route"
- "Weighted graph"

Common Problems:

- Network Delay Time
- Path with Minimum Effort

🔹 6. Bellman-Ford Algorithm

Use When:

- Graphs with **negative weights**
- Need to detect **negative weight cycles**

Look for Keywords:

- "Negative weights"
- "Profit loop"
- "Arbitrage"

Common Problems:

- Currency Exchange
- Arbitrage Detection

🔹 7. Floyd-Warshall Algorithm

Use When:

- All-pairs shortest paths in **small dense graphs**

Look for Keywords:

- "Between all pairs"
- "Compare all distances"

Common Problems:

- Find the City with the Fewest Neighbors
- Minimum Score Triangulation of Polygon

🔹 8. Prim's Algorithm

Use When:

- Building MST (Minimum Spanning Tree)

Look for Keywords:

- "Connect all nodes with minimum cost"
- "Minimum wiring/roads"

Common Problems:

- Connecting Cities with Minimum Cost
- Minimum Cost to Connect All Points

Comments (2) Sort by: Best

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Mahim Dashora

May 25, 2025

Wow , was searching for it so badly . Thank you for this cheat sheet , will refer it next time when revising graphs

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aryandshukla

Jun 04, 2025

Graph - https://techwithkp.com/dfs-vs-bfs-with-problems-and-solutions-in-java/

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