Solutions

2.1

- List: 24 entries (each undirected edge twice) ✓.
- Matrix: $9 \times 9 = 81$ cells ✓.

2.2

- The shortest hop count from the start ✓.
- Unweighted edges only – weights need Dijkstra ✓.

2.3

- Mark each node visited once and never re-enqueue it ✓.
- Without it, any cycle loops forever ✓.

3.1

- List: P:Q, R; Q:P, S; R:P, S; S:Q, R, T; T:S ✓.
- BFS: P, Q, R, S, T with layers $P \,|\, Q, R \,|\, S \,|\, T$ ✓.
- DFS: $P \to Q \to S \to R$ (backtrack) $\to T$: order P, Q, S, R, T ✓.
- On the list: $O(V + E) = O(5 + 5)$ ✓.
- On the matrix: $O(V^2) = 25$ cells scanned ✓.

3.2

- Network: $V = 10^6$, $E = 10^6 \times 50/2 = 2.5 \times 10^7$ ✓.
- List entries: 5×10^7; matrix cells: 10^{12} – list wins by four orders of magnitude ✓.
- Timetable: 300 stations, about half of $300^2 = 90\,000$ cells set – dense ✓.
- The question is one cell lookup: the matrix answers in $O(1)$ – matrix wins ✓.

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