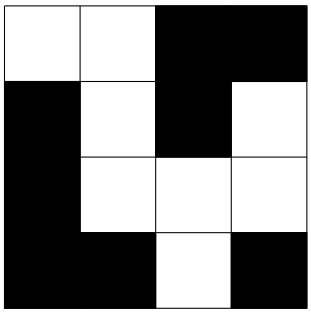
Week 14: A-Star Search Algorithm

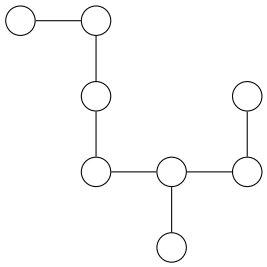
Day 25 (R 4/23): Backtracking and Enumeration

- **Video (15 min)**: Watch the following video introducing the A-star (A^*) algorithm. `https://youtu.be/bQLIAxf0Ay4`
- **Exercise (10 min)**: As stated in the video, A^* is guaranteed to return an optimal solution (shortest path) if the heuristic function $h : V \mapsto \mathbb{R}$ is admissible. A heuristic function $h(v)$ is admissible if $h(v)$ is at most the actual length of a shortest path from v to the goal vertex t.

  Suppose that the graph G corresponds to a grid maze (see below), and find an admissible heuristic for this setting. Your heuristic should be defined for *any* maze graph, not just the example below.



Maze



Corresponding Graph

- **Video (10 min):** Watch the following video with more details about the A^* algorithm. `https://youtu.be/1OLwN6eDOQk`
- **Exercise (10 min)**: Play around with the following interactive visualization of Dijkstra's and the A^* algorithm. What is the difference between the Euclidean and Manhattan distance heuristics? `https://qiao.github.io/PathFinding.js/visual/`.

Extra Resources for the Week

- A-Star Description: `https://www.redblobgames.com/pathfinding/a-star/introduction.html`
- A-Star Visualization: `https://qiao.github.io/PathFinding.js/visual/`