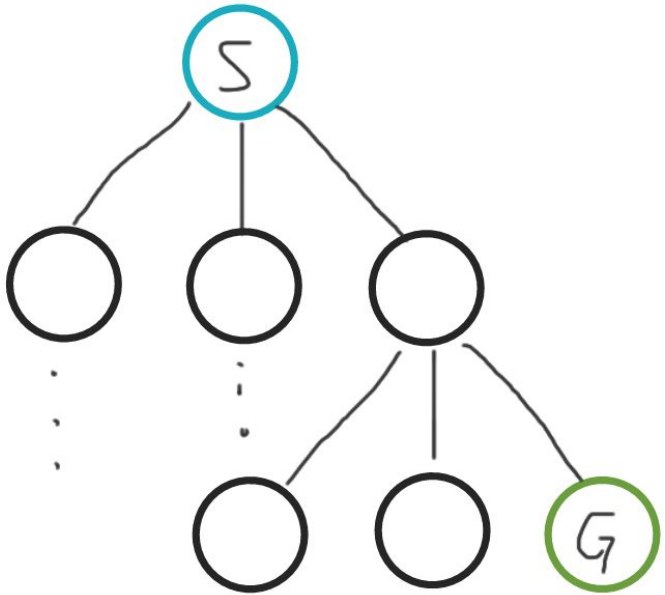
Search Review Session

Components of a search problem:

- State space
- Start state
- Goal state
- Successor function
- Action cost
- Goal test



Uninformed Search Algorithms

Algorithm	Fringe	Complete?	Optimal?
Depth-first search: Explore a path fully before backtracking	Stack	Tree search: no Graph search: depends on size of state space	No
Breadth-first search: Search all children of the current node, level by level	Queue	Yes	No, unless all edge costs are the same
Uniform cost search: Explore the cheapest path first	Priority queue, sorted by cumulative cost	Yes	Yes, if edge costs are positive
Iterative deepening: DFS up to a certain depth each time	Stack, like DFS	Yes, like BFS	No, like BFS

Informed Search Algorithms

Algorithm	Fringe	Complete?	Optimal?
Greedy search	Priority queue, sorted by heuristic	Yes, if finite state space	No
A* search	Priority queue, sorted by true cost so far and heuristic	Yes, if finite state space	Yes, if admissible heuristic (tree search) or consistent heuristic (graph search)

Heuristic Definitions

- **Admissible:** For any node X,
  $0 \leq h(X) \leq cost(X)$
- **Consistent:** For a node A and its descendant B,
  $h(A) - h(B) \leq cost(A, B)$, or
  $h(A) \leq cost(A, B) + h(B)$
- **Dominance:**
  h_1 dominates h_2 if $h_1(X) \geq h_2(X)$ for every node X