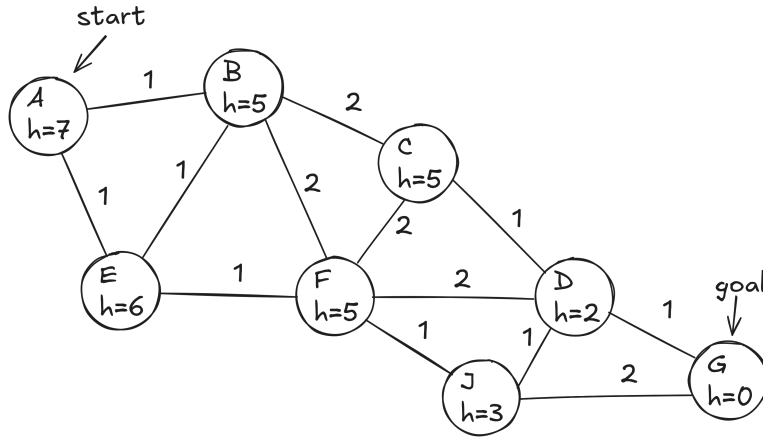# CSCI 4511/6511 - Exam Prep 1

Instructions:
This is ungraded exam preparation.

1 Uniform-Cost Search

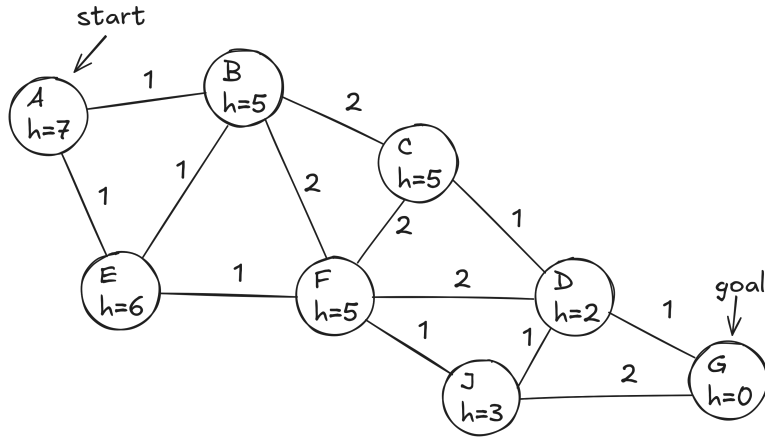List the nodes in their **order of expansion** for UCS used to solve the following problem:

Edge weights are as marked. Ignore heuristic values.

For each node, include the *path* and the total *path cost* to each node.
Example (for one node): B , A → B , 1

2 A* Search

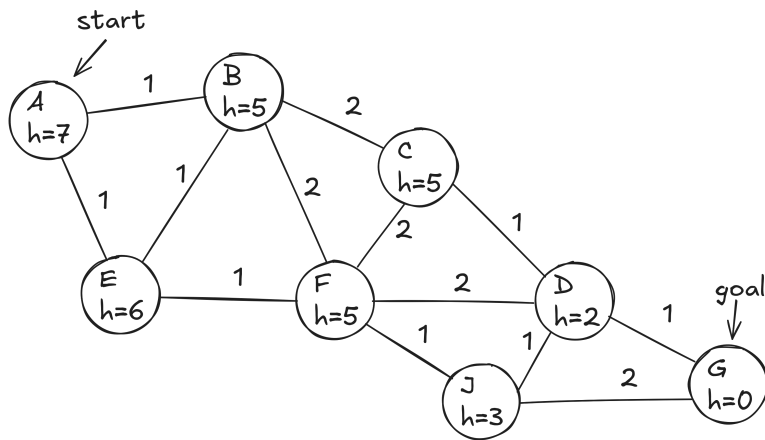List the nodes in their order of expansion for A* used to solve the following problem:

Edge weights are as marked. Heuristic values are indicated for each node.
For each node, include the *path* and the total *path plus heuristic cost* to each node.
Example (for one node): B , A → B , 6

3 A* Search - Admissibility

For this problem, is the heuristic admissible? Why or why not.

start

A h=7
B h=5
C h=5
E h=6
F h=5
D h=2
J h=3
G h=0 goal

Edges and weights:
- A–B: 1
- A–E: 1
- B–E: 1
- B–F: 2
- B–C: 2
- C–F: 2
- C–D: 1
- E–F: 1
- F–D: 2
- F–J: 1
- D–J: 1
- D–G: 1
- J–G: 2

4 Depth-Limited Search

Rewrite the Depth-First Search algorithm below to terminate in failure if the search tree is exhaustively searched to depth 6 (inclusive of the initial node) without reaching the goal.

Algorithm Depth-First Search

1: **function** DEPTH-FIRST-SEARCH($problem$)
2:     $node \leftarrow$ NODE(STATE=$problem$.INITIAL)
3:     $frontier \leftarrow$ LIFO stack
4:     $frontier$.PUSH($node$)
5:     **while not** IS-EMPTY($frontier$) **do**
6:         $node \leftarrow$ POP($frontier$)
7:         **if** $problem$.IS-GOAL($node$.STATE) **then**
8:             **return** $node$
9:         **else if not** IS-CYCLE(node) **then**
10:             **for each** $child$ **in** EXPAND($problem$,$node$) **do**
11:                 $frontier$.PUSH($child$)
12:     **return** $failure$

---

5   A* Search - Consistency

Prove that the Manhattan distance heuristic used in the Pacman environment from Homework 1 is consistent.

Intentionally blank.

This is the back of the exam prep.