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Artificial Intelligence
HW 1

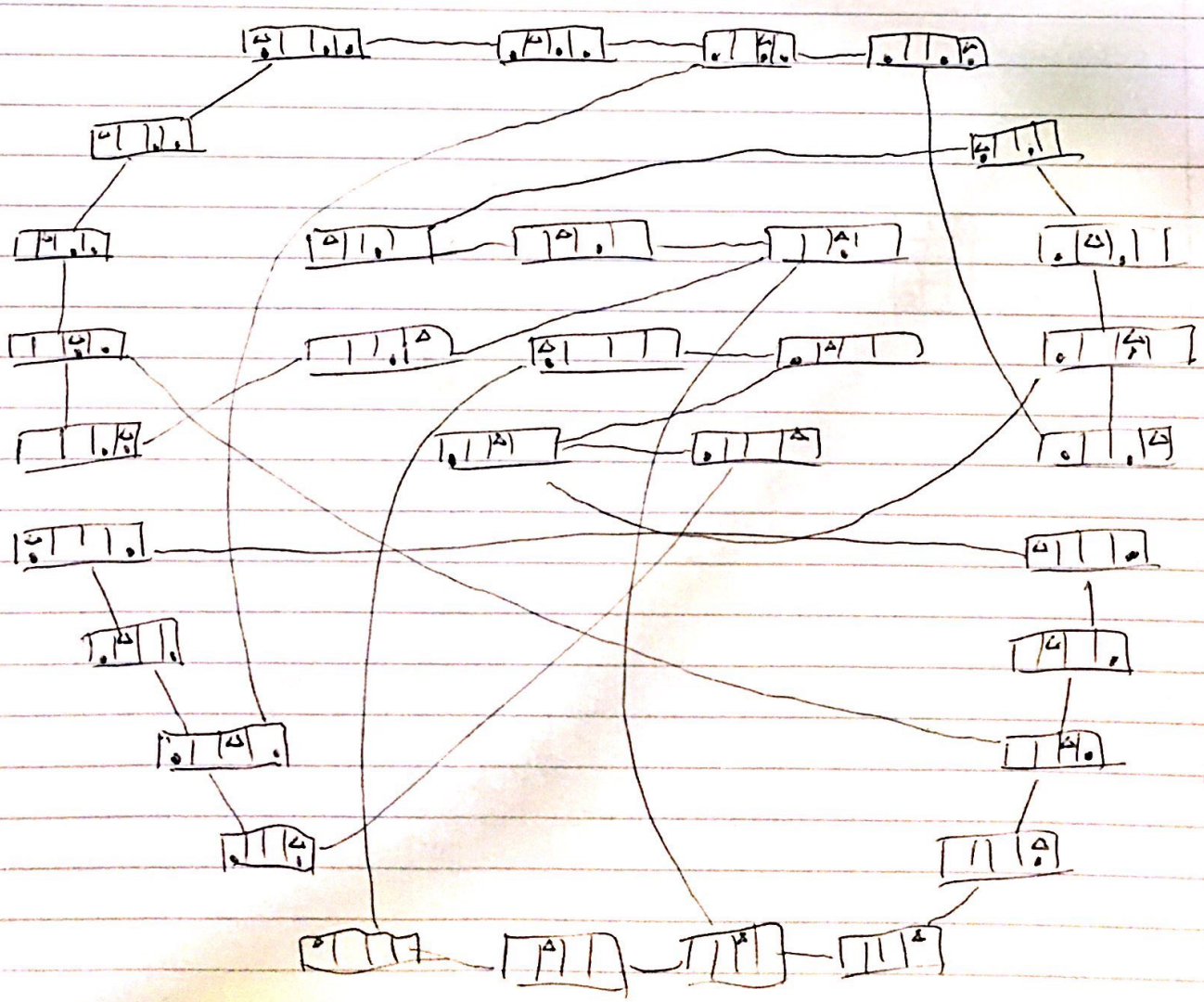
1. Simple reflex agent

2. (d) Acting humanly

3a. size of the state space = num of combinations of dirty/clean squares * num of possible vacuum positions

size of the state space = $2^3 * 4$
size of the state space = $\boxed{32}$

3b.



4a. state is amount of water in 4-gallon jug and the 9-gallon jug

b. initial state is when both jugs are empty

goal state is when there are 2 gallons of water in the 4-gallon jug

Set of operators (actions):

- fill up the 4-gallon jug
- fill up the 9-gallon jug
- pour water from 4-gallon jug to 9-gallon jug until 9-gallon jug is full
- pour water from 4-gallon jug to 9-gallon jug until 4-gallon jug is empty
- pour water from 9-gallon jug to 4-gallon jug until 4-gallon jug is full
- pour water from 9-gallon jug to 4-gallon jug until 9-gallon jug is empty
- dump out water in 4-gallon jug
- dump out water in 9-gallon jug

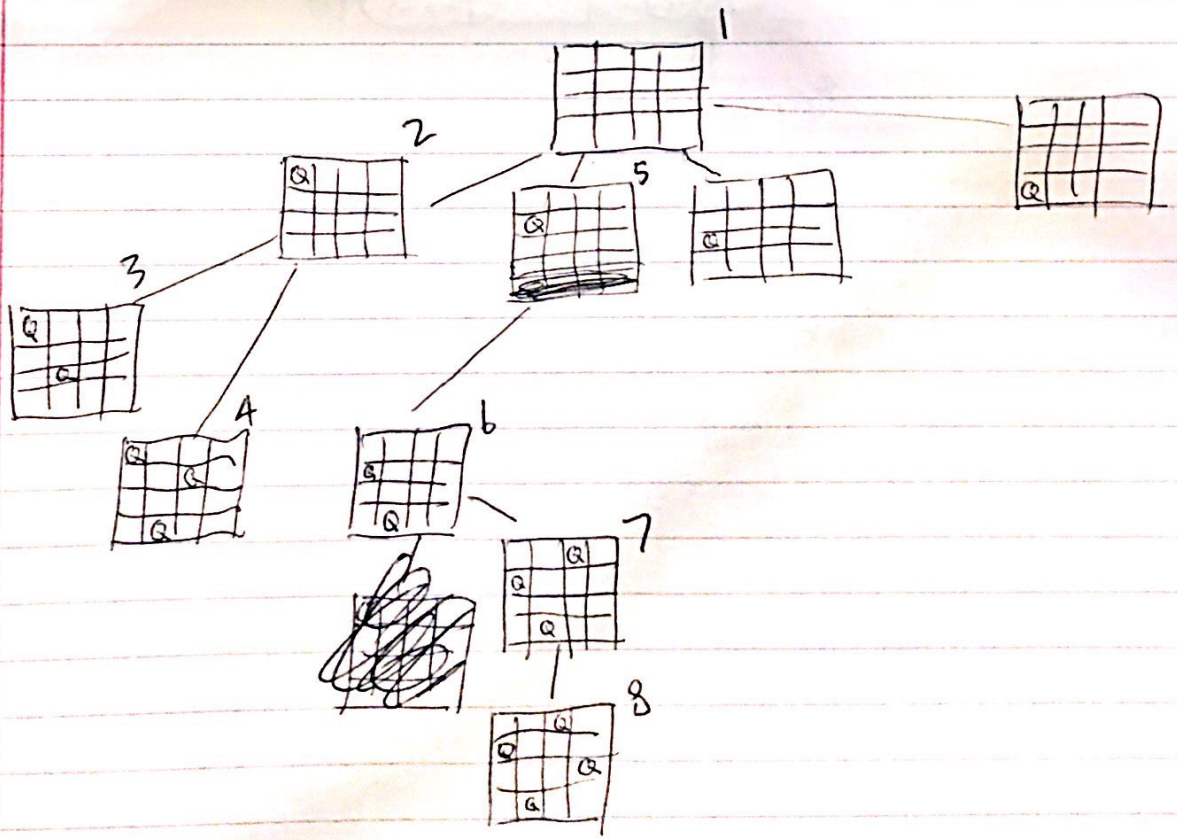
ALL ACTION COSTS = 1 because water is unlimited and so we count each action

b. True

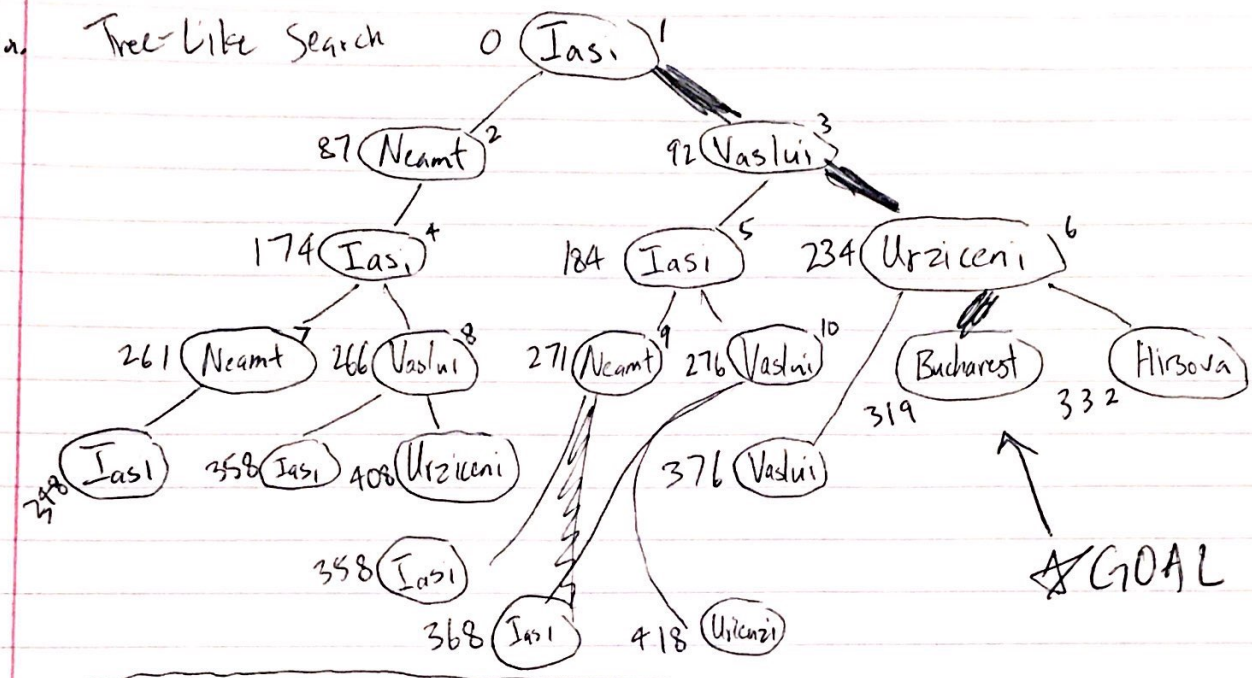
c. False

d. True

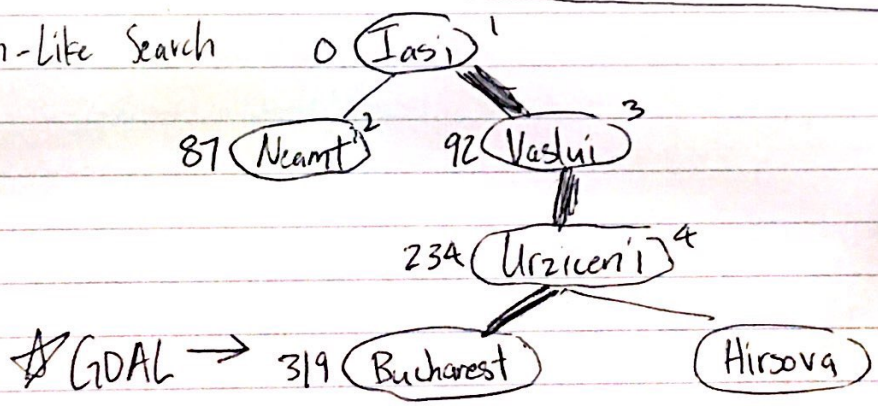
5.



6a. Tree-Like Search



b. Graph-Like Search



7a. Maximum number of nodes in depth-first search tree-like search = b^m

b. Maximum number of nodes in depth-limited search tree-like search = b^l

c. Maximum number of nodes in depth-first search graph-like search = the size of the state space