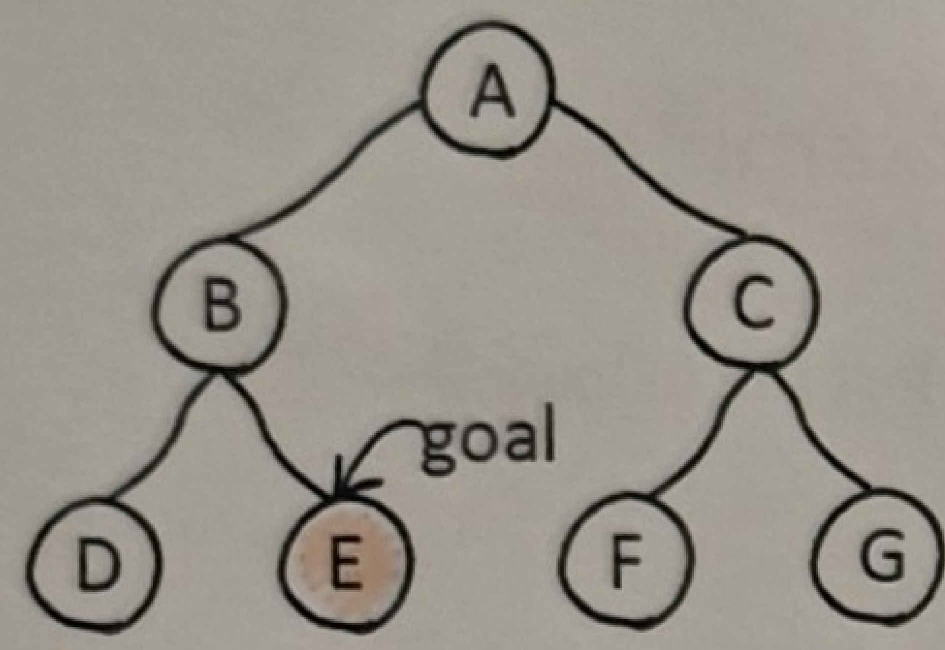
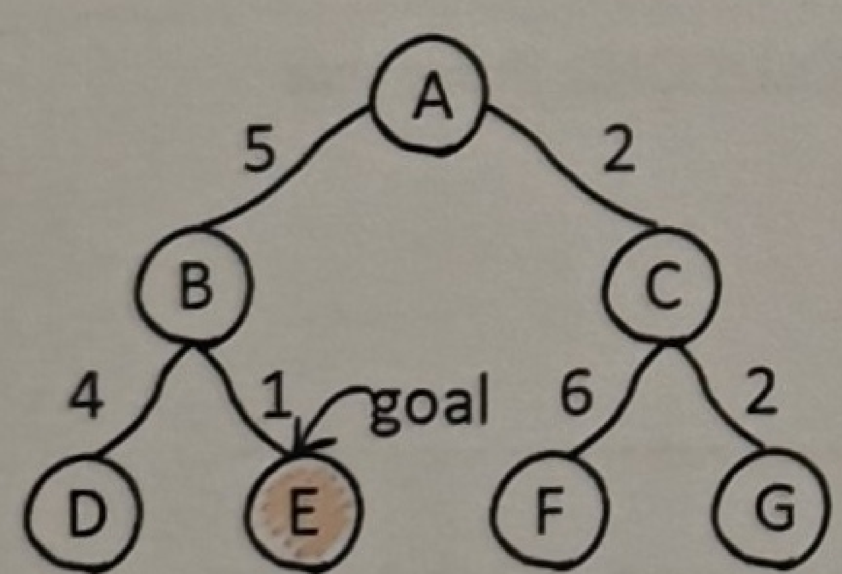
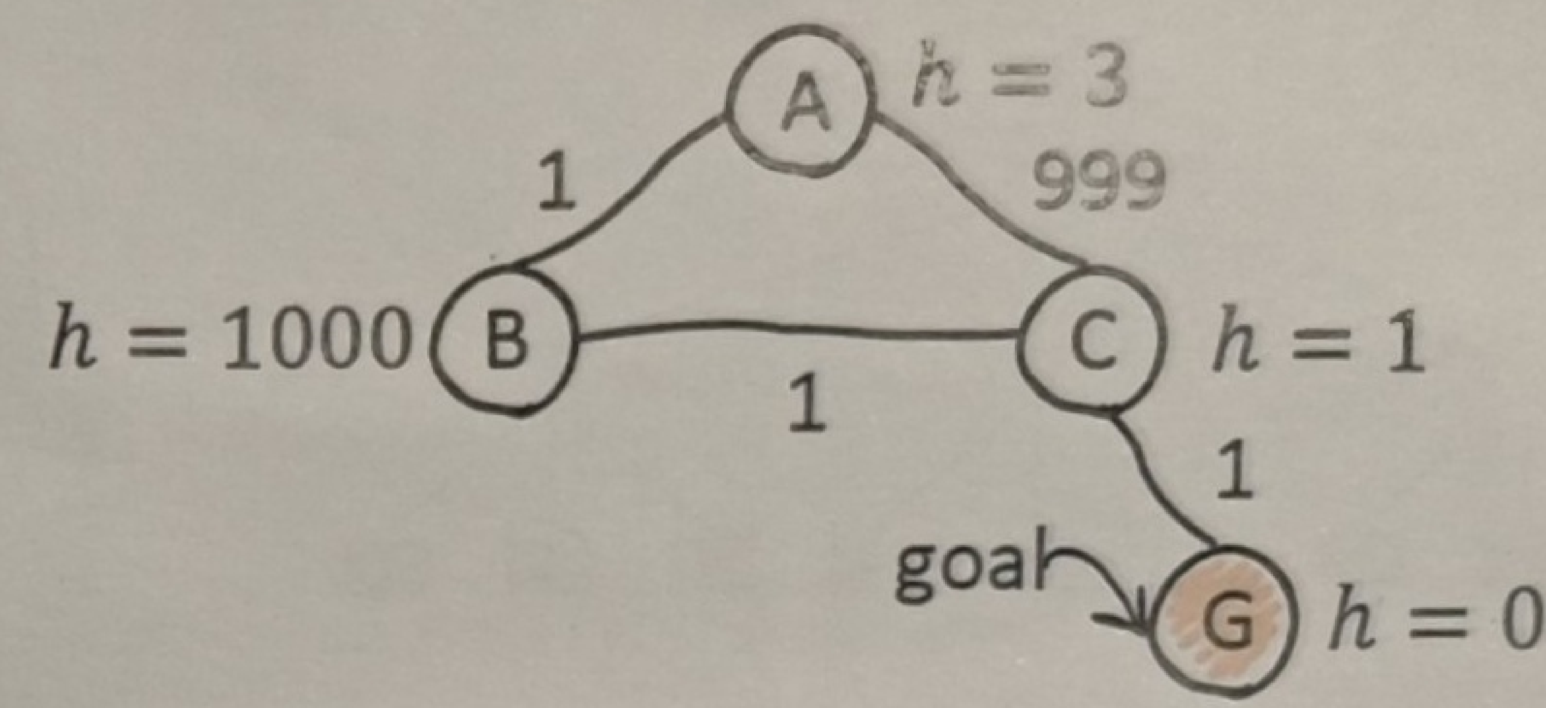


expand node	nodes list
	{A}

1. Here is the tree, please do the following tree search and filling the expand node and nodes list for each of them.
   a) BFS: breadth-first search (10 pts)
   b) DFS: depth-first search (10 pts)
   c) UCS: uniform-cost search with the cost numbers as below (10 pts)

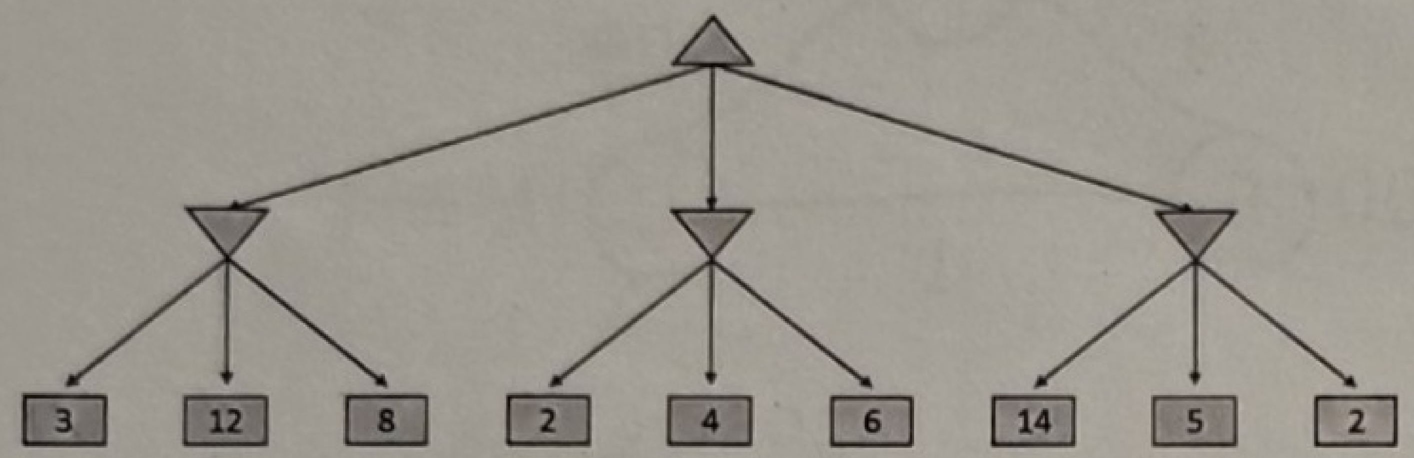




expand node	nodes list
	{A}

2. Here is the tree, please do the following tree search and filling the expand node and nodes list for each of them. (20 pts)
   a) A search (the edge numbers are g(n) and the node numbers are h(n))
      i. Whether this A search is optimal? If not, why and how to improve that?

Minimax Example



3. The root is max and the second layer is min, (20 pts)
   a) fill the tree by minimax algorithm.
   b) Using alpha-beta pruning, which nodes (leaves) should be pruned from the tree? After pruning, draw the minimax algorithm again.
   c) For the pruning, do you have better idea to order the nodes (leaves) to prune more structure from the tree? And why it works?

Example

- Suppose the KB contains just the following:
  - → John like all kinds of food.
  - → Apples are food.
  - → Anything anyone eats and isn't killed by is food.
  - → Bill eats peanuts and is still alive.
  - → Sue eats everything Bill eats.

Prove that "John likes peanuts".

- Represent the KB with first-order logic sentences.

→ John like all kinds of food.	→ ∀x (Food(x) ⇒ Like(John, x))
→ Apples are food.	→ Food(Apple)
→ Anything anyone eats and isn't killed by is food.	→ ∀x ∀y (Eat(x,y) ∧ ¬Killed by(x,y)) ⇒ Food(y)
→ Bill eats peanuts and is still alive.	→ Eat(Bill, penut) ∧ ¬Killed by(Bill,peanut)
→ Sue eats everything Bill eats.	→ ∀x (Eat(Bill,x) ⇒Eat(Sue,x))

4. Solve the above problem by RESOLUTIONS: Prove that "John likes peanuts" (20 pts)

$$KB \wedge \neg\alpha = (\neg P_{2,1} \vee B_{1,1}) \wedge (\neg B_{1,1} \vee P_{1,2} \vee P_{2,1}) \wedge (\neg P_{1,2} \vee B_{1,1}) \wedge (\neg B_{1,1}) \wedge (P_{1,2})$$

5. Given the **KB and (not \alpha)** as above, using resolution to prove that **KB entails \alpha**. (10 pts)