

Artificial Intelligence Assignment 2

1. Prove the following using resolution.

i) All humans are mortal.

Socrates is a human.

Prove that Socrates is mortal.

ii) All birds can fly.

Penguins are birds.

Prove or disprove that Penguins can fly using resolution.

iii) Every person has at least one parent.

Alice is a person.

Prove that Alice has at least one parent using resolution.

iv) Every student studies.

Alice is a student.

Prove that Alice studies.

2. Consider the argument, "All dogs bark. Some animals are dogs. Therefore, some animals bark". Determine whether the conclusion is a valid consequence of the premises.

[Hint: Step 1: Convert all statements to First-Order Logic (FOL).

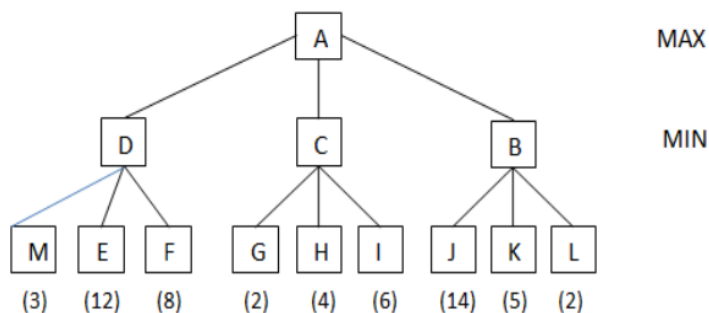
Step 2: Convert to Clause Form (CNF).

Step 3: Negate the conclusion.

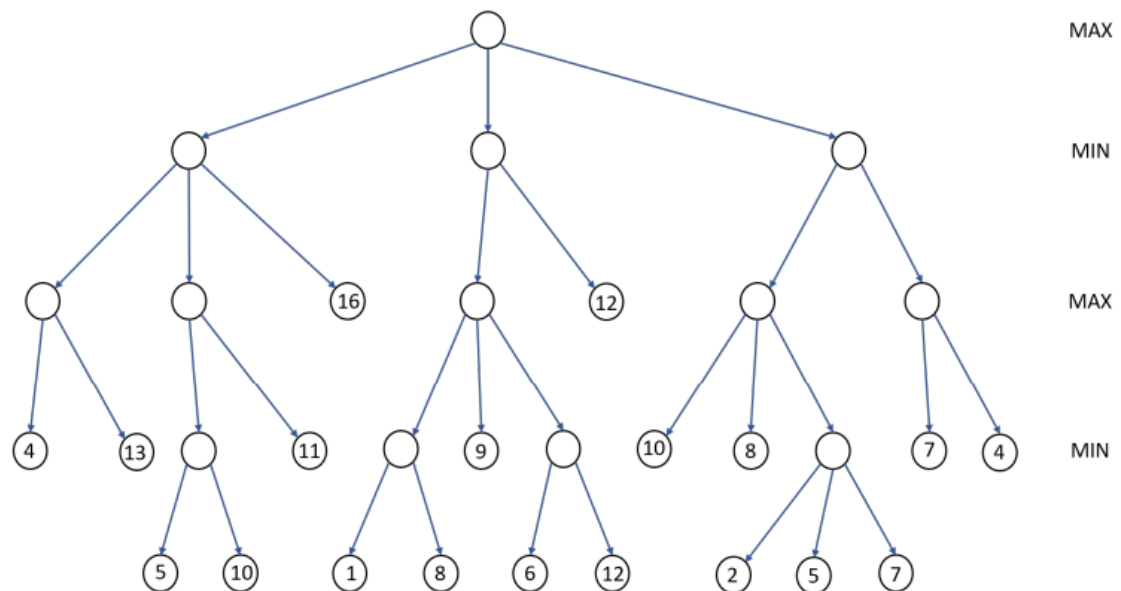
Step 4: Apply Resolution (Unification & Elimination).

Step 5: If we derive \perp (contradiction), the original conclusion is true.]

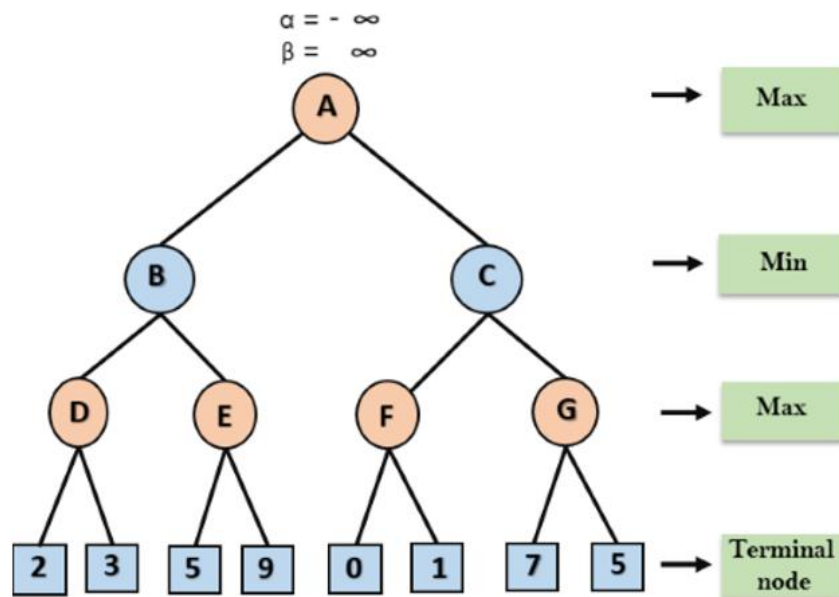
3. In the following two-ply game tree, the terminal nodes show the utility values computed by the utility function. Use the Minimax algorithm to compute the utility values for other nodes in the given game tree



4. Use the Minimax algorithm to compute the minimax value at each node for the game tree below.



5. Solve using Alpha Beta Pruning



6. Describe Bayesian networks. How are the Bayesian networks powerful representations for uncertainty knowledge?
7. Differentiate between Explanation-based learning, learning by analogy, discovery-based learning, Neural net learning and Genetic Learning. Also describe the respective applications.

8. Explain various member functions used in fuzzy logic. Explain fuzzy controllers.
9. What are the various applications of NLP. List the challenges often faced in this domain.
10. Explain K- Means clustering along with its pros and cons.
11. Explain the importance of machine learning in artificial intelligence. Differentiate between the following:
 - i) Supervised and unsupervised learning
 - ii) Classification and clustering
12. Differentiate between syntax analysis and semantic analysis in NLP with examples.
13. Explain the role of tokenization, stemming, and lemmatization in NLP.