

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING,
nec, Bhaktapur**

**ARTIFICIAL INTELLIGENCE
Lab Sheet II**

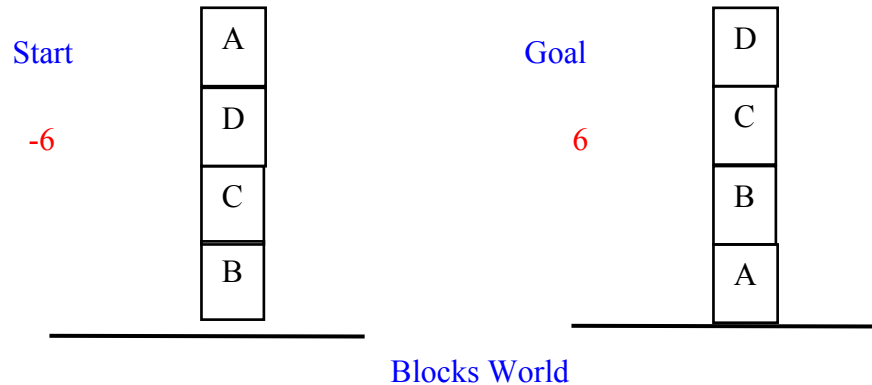
1. WAP in Python will implement DFS/BFS on the water jug problem.
Given a 4 - litre jug filled with water & an empty 3 - litre Jug, how can one obtain exactly 2 liters in 4 litres jug. There is no measuring mark on any of them.
 - Define WaterJug Class with a constructor to initialize the initial and goal state
 - Define boolean goalTest(current_state, goal_state) to check if current_state is goal_state or not
 - Define successor() with reference to the production system to generate possible child(s).
 - Verify if successor() is working properly or not
 - Define DFS/BFS search algorithm to find the solution
 - Modify search algorithm to store state,parent in CLOSED list and also define generate_path() to provide the path of solution.
2. Based on your last digit of your CRN, implement the following search problems as above

The last Digit of CRN	Problem
0	City-Map Problem
1	n-Puzzle
2	Missionaries and Cannibals
3	Towers of Hanoi
4	Tic-Tac-Toe
5	Block World
6	Man Goat Lion Cabbage
7	Monkey and Bananas Problem
8	n-Queen Problem
9	Water Jug with arbitrary size i.e. user will input the container size.

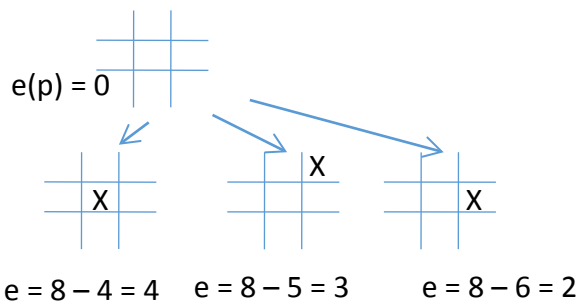
3. WAP in Python to calculate the heuristic value of the states for Blocks World Problem as follows
Global heuristic: e(p) is calculated as
 - For each block that has the correct support structure: +1 to every block in the support structure.

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- For each block that has a wrong support structure: -1 to every block in the support structure



4. WAP in Python to calculate the heuristic value of the states for Tic-Tac-Toe as follows



Heuristic function:

$e(p) = \text{No. of complete rows, columns or diagonals are still open for player} - (\text{No. of complete rows, columns or diagonals are still open for opponent})$

5. Solve the 8 puzzle problems using A* algorithm in Prolog.
6. Write a program to implement the steepest ascent hill climbing for the 8-puzzle problem. Develop appropriate heuristic functions.