Quiz

CSE-404

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Ans. to the ques. no. -01

4-Queen problem solving with CSP. To solve a problem using csp we need to define variables and their domain ranges and also constraints.

4-Queen Variables:

For the 4-Queen, we can assign a variable to each of the queens. So, we need 4 variables for that.

Variables: Q_1, Q_2, Q_3, Q_4.

Domain:

Each of the 4 variables (Q_1, Q_2, Q_3, Q_4) can take any variable from 1 to 4. (since 4×4 chessboard, so, 4 rows and 4 columns)

So, Q_1 = [1 to 4] [1 to 4] same for others,

↑ Row ↑ column.

So, Q_1 [3] [1] means 3rd Row of the 1st column.

Constraints:

① 1 Queen can attack along Row, Column and diagonal.

(1) So, No two queen or No pair of Queens can be on the same Row: therefore:

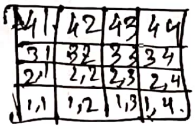
$$(Q_i[x][y], Q_j[x][y']) = \text{False}$$ [Not in the goal State)

(2) No pair of Queens can be on the same Column: therefore:

$$(Q_i[x][y], Q_j[x][y]) = \text{false}$$

(3) No pair of Queens can be on the same diagonal:

$(Q_i[x_1][y_1], Q_j[x_2][y_2])$ ~~of false~~



And, $x_1 - x_2 \neq y_1 - y_2$

, in diagonal diff between x_1 and x_2 and diff between y_1 and y_2 are same.

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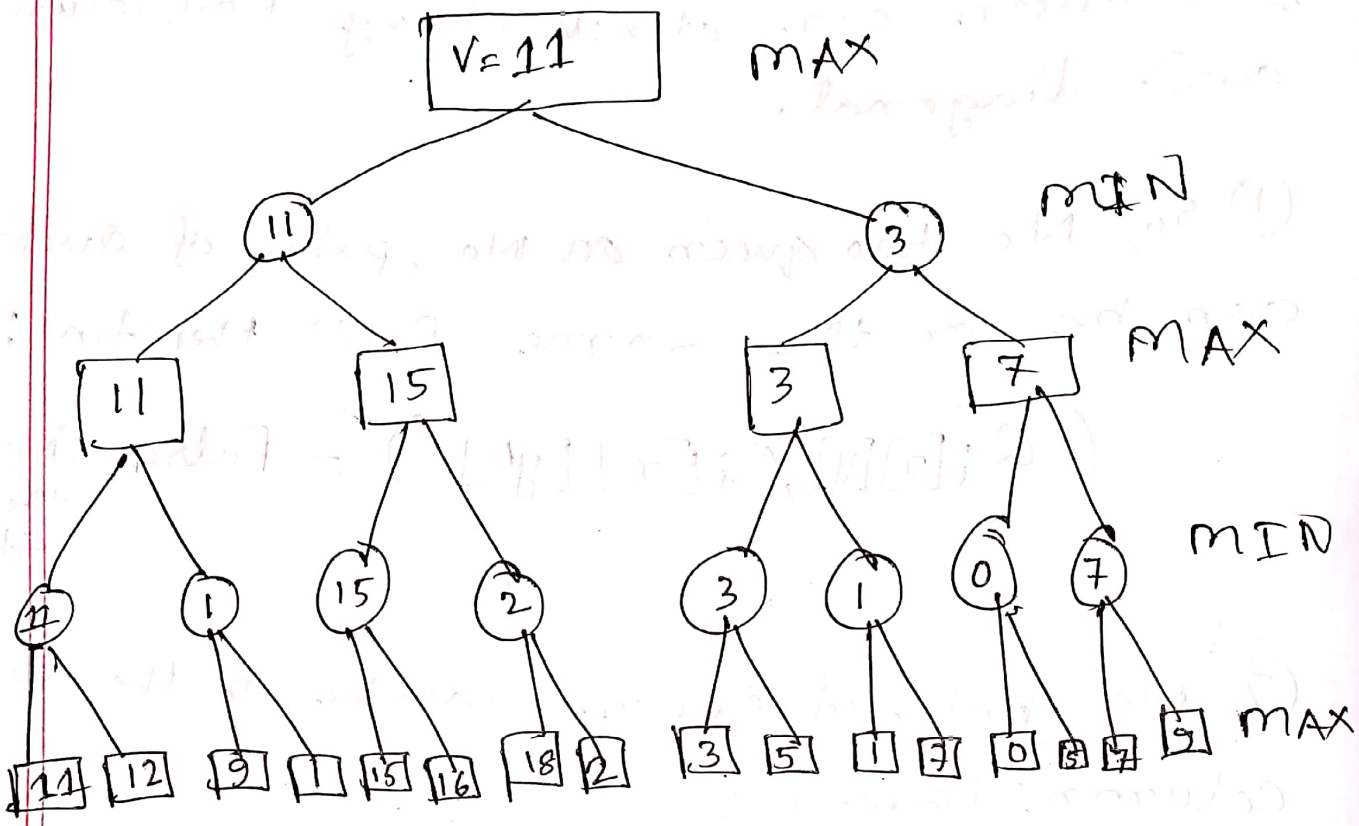
Ans. to the ques. no.-02



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Ans. to the Ques. no. 03

For the Jug Filling problem we can represent 2 Jugs as a state like this [A|B], where, A is the amount(L) of water in Jug 1 and B is the amount(L) of water in Jug 2.

And we can do the following action on any state;

(1) Empty any one Jug → [A|0] or [0|B]

(2) Move water from one Jug to another.

(3) Fill any one Jug → [2|x]

So, the 3L and 4L Jug to get 2L water. Then the start Node/state would be [0|0] and ~~the goal state~~ Then we can do any of the ~~following~~ above actions on the start state and generate the tree. we will create the tree and, until we find the Goal State, ie. [0|2] or [2|0] or [2|x] or [x|2]

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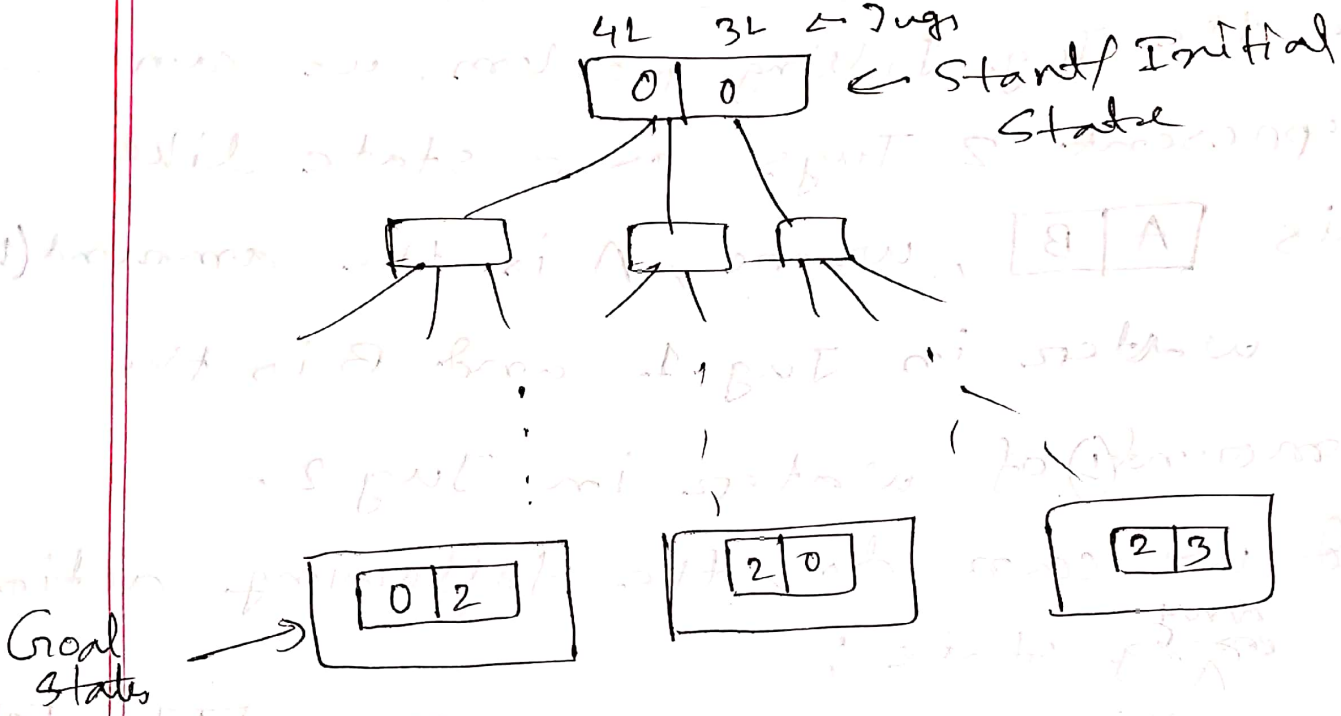
Then the tree would be:



STATE Representation of Jug Filling Problem

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Ans. to the ques. no. - 04

Here,

White is played by the AI player.

and, Black is played by the Human.

A suitable Heuristic for the A* search would be:

① Available squares for the king to safely move in the next move.

So, white (AI) will try to reduce the Heuristic by doing less costly moves. ~~(g score)~~

And, If there is a point where, Black has no square to move (which is checkmate) The white (AI) wins. And white can move (possible actions) Rook and the king to checkmate and reduce the safe squares for the black king.