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SUB: Artificial Intelligence
Lab.

Question: You are given 2 jugs, a 4-litre one and a 3 litre one. Neither has any measuring marks on it. There is a pump that can be used to fill the jugs with water. How do you get exactly 2 litres of water into 4-litre jug. Implement using d+c.

~~Initial state~~ :

State = ((amount of water in jug with 4 litres), (amount of water in jug with 3 litres))

initial state : (0,0)

final state/ Goal state : (2,0) or (0,2)

Transitions / operations:

i) fill water jug.

$(x,y) \rightarrow (4,y)$ if $x < 4$

$(x,y) \rightarrow (x,3)$ if $y < 3$

ii) empty water jug

$(x,y) \rightarrow (0,y)$ if $x != 0$

$(x,y) \rightarrow (x,0)$ if $y != 0$

iii) Transfer water from 1 jug to other

$(x,y) \rightarrow (4, y-(4-x))$ if $(x+y \geq 4)$

transfer 4 jug y to jug x until jug x fill.

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$(X,Y) \rightarrow (X-(3-Y), 3)$ if $X+Y >= 3$

pour from X to Y until *Y gets filled.

$(X,Y) \rightarrow (X+Y, 0)$

Pour all water from jug Y to jug X.

$(X,Y) \rightarrow (0, X+Y)$

Pour all water from jug X to jug Y.

```
def water_jug_dfs(present_state, goal_state,
                  visited)
    if (present_state == goal_state)
        return True.
    next_possible_states
        = gen_next_possible_states(present_state)
    for next_state in next_possible_states
        if next_state not in visited
            visited.append(next_state)
            if(water_jug_dfs(next_state,
                             goal_state))
                return True.
    return False.
```

```
def gen_next_possible_state(present_state)
    next_possible_state = []
    x = present_state[0]
    y = present_state[1].
    if (x < 4) next_possible_state.app
        next_possible_state.append([4, y])
    if (y < 3)
        next_possible_state.append([x, 3])
    if (x != 0)
        next_possible_state.append([0, y])
    if (y != 0)
        next_possible_state.append([x, 0])
    if (x+y >= 4)
        next_possible_state.append([4, (y-(4-x))])
    if (x+y >= 3)
        next_possible_state.append([x-(3-y), 3])
    if (x+y <= 4)
        next_possible_state.append([x+y, 0])
    if (x+y <= 3)
        next_possible_state.append([0, x+y])
```


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