

**EX.NO:3**

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### **DEPTH-FIRST SEARCH – WATER JUG PROBLEM**

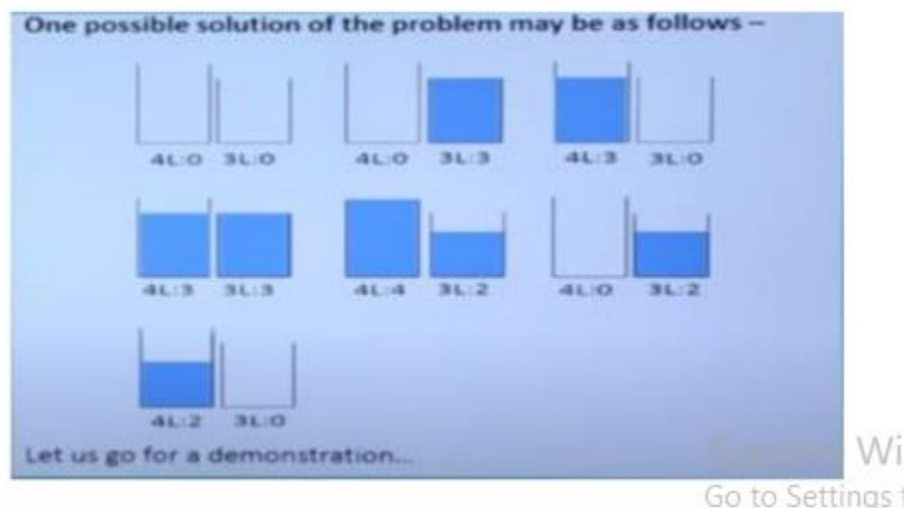
In the water jug problem in Artificial Intelligence, we are provided with two jugs: one having

the capacity to hold 3 gallons of water and the other has the capacity to hold 4 gallons of water.

There is no other measuring equipment available and the jugs also do not have any kind of marking

on them. So, the agent's task here is to fill the 4-gallon jug with 2 gallons of water by using only

these two jugs and no other material. Initially, both our jugs are empty.



## CODE:

```
def dfs(x, y, target, visited, path, a, b):
    if b == target:
        print("Solution found:")
        for step in path:
            print(step)
        return True
    if (a, b) in visited:
        return False
    visited.add((a, b))
    path.append(f"({a}, {b})")
    if dfs(x, y, target, visited, path, x, b):
        return True
    if dfs(x, y, target, visited, path, a, y):
        return True
    if dfs(x, y, target, visited, path, 0, b):
        return True
    if dfs(x, y, target, visited, path, a, 0):
        return True
    if a + b <= y:
        if dfs(x, y, target, visited, path, 0, a + b):
            return True
    else:
        if dfs(x, y, target, visited, path, a - (y - b), y):
            return True
    if a + b <= x:
        if dfs(x, y, target, visited, path, a + b, 0):
            return True
    else:
        if dfs(x, y, target, visited, path, x, b - (x - a)):
            return True
    path.pop()
    return False

def water_jug_dfs():
    x, y = 3, 4
    target = 2
    visited = set()
    path = []
    if not dfs(x, y, target, visited, path, 0, 0):
        print("No solution exists.")

water_jug_dfs()
```

## OUTPUT:

The screenshot shows a Google Colab notebook titled "220701902\_POAI\_RECORD.ipynb". The notebook is open to a code cell containing the function `water_jug_dfs()`. The output of the function is displayed below the code cell, showing the solution found:

```
Solution found:  
(0, 0)  
(3, 0)  
(3, 4)  
(0, 4)  
(3, 1)  
(0, 1)  
(1, 0)  
(1, 4)
```

The notebook interface includes a top bar with the Google Colab logo, the notebook title, and a "Share" button. Below the top bar is a menu bar with options: File, Edit, View, Insert, Runtime, Tools, and Help. The left sidebar contains icons for file management, search, and other notebook features. The bottom status bar indicates that the code cell was completed at 10:30 PM.