

EX.NO:3

DATE:16/10/2024

Reg.no:220701031

DEPTH-FIRST SEARCH – WATER JUG PROBLEM

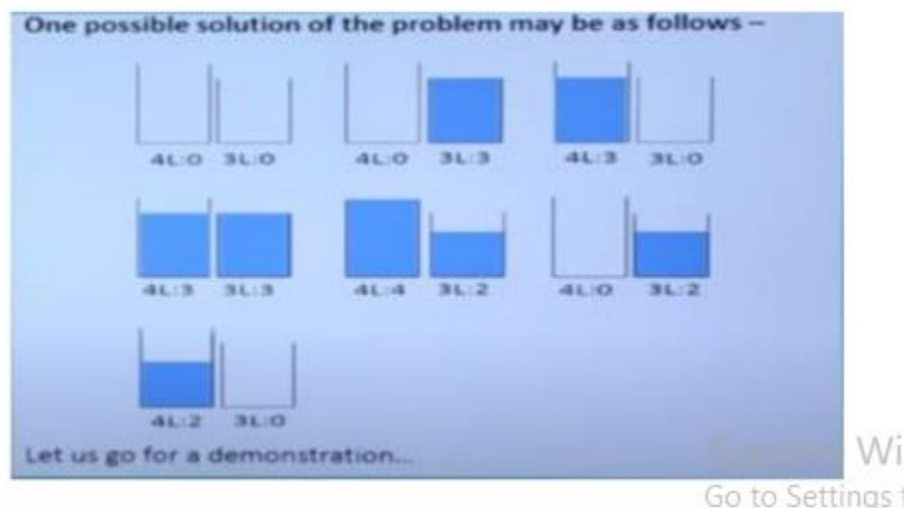
In the water jug problem in Artificial Intelligence, we are provided with two jugs: one having

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.



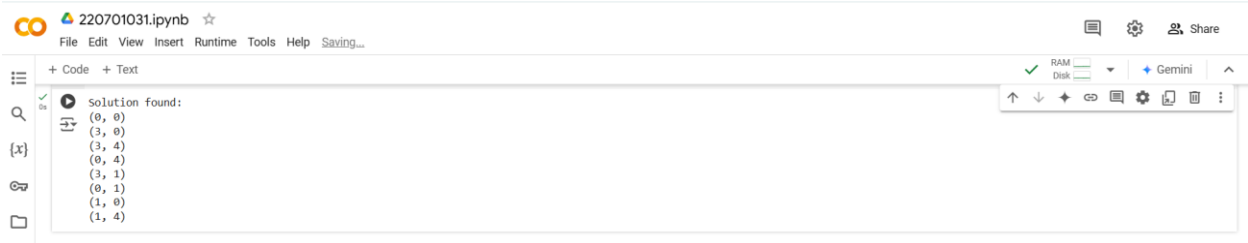
CODE:

```
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 image shows a Jupyter Notebook interface. At the top, the file name is '220701031.ipynb'. The menu bar includes 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', 'Help', and 'Saving...'. On the right, there are icons for chat, settings, and sharing. Below the menu, there are tabs for '+ Code' and '+ Text'. The main area displays the output of a search algorithm, which is a list of coordinate pairs. The output is preceded by a play button icon and the text 'Solution found:'. The list of pairs is: (0, 0), (3, 0), (3, 4), (0, 4), (3, 1), (0, 1), (1, 0), and (1, 4). On the left side, there is a sidebar with icons for search, {x}, and a folder icon. On the right side, there is a toolbar with icons for up, down, left, right, and other actions.

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