

EX.NO:3

DATE:16/10/2024

Reg.no:220701014

DEPTH-FIRST SEARCH – WATER JUG PROBLEM

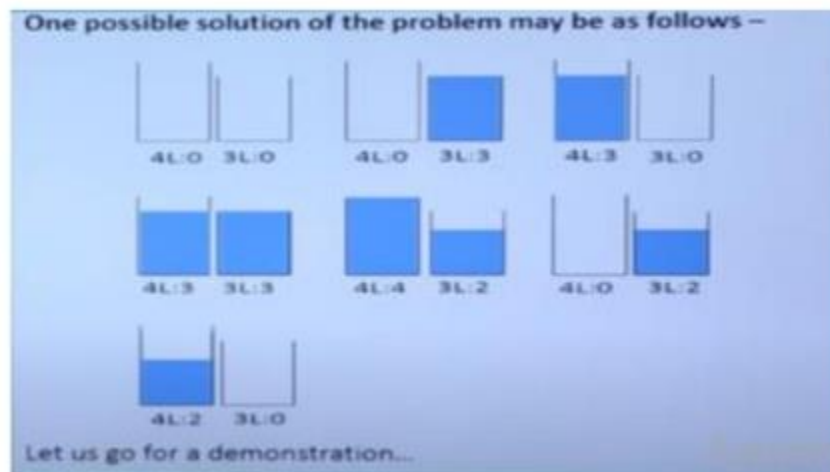
In the water jug problem in Artificial Intelligence, we are provided with two jugs: one having

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.



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Go to Settings 1

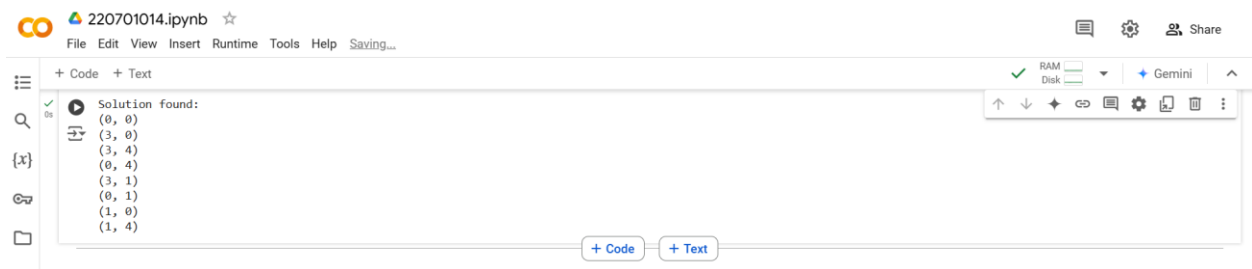
CODE:

```
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 with a file named '220701014.ipynb'. The notebook has a menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', 'Help', and 'Saving...'. On the left, there is a sidebar with icons for a list, search, {x}, and a folder. The main area displays the output of a code cell, which is a list of solutions found. The output is as follows:

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

At the bottom of the notebook, there are two buttons: '+ Code' and '+ Text'. On the right side of the notebook, there is a toolbar with icons for RAM, Disk, Gemini, and a share icon.