

EX.NO:3

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Reg.no:220701013

DEPTH-FIRST SEARCH – WATER JUG PROBLEM

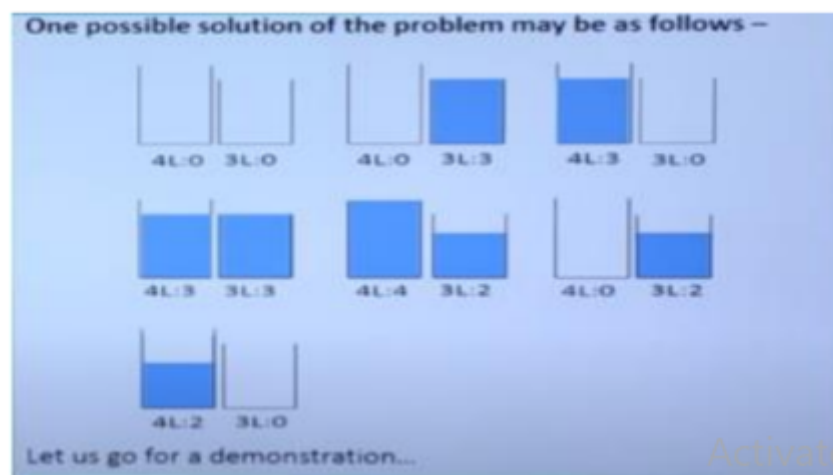
In the water jug problem in Artificial Intelligence, we are provided with two jugs: one having

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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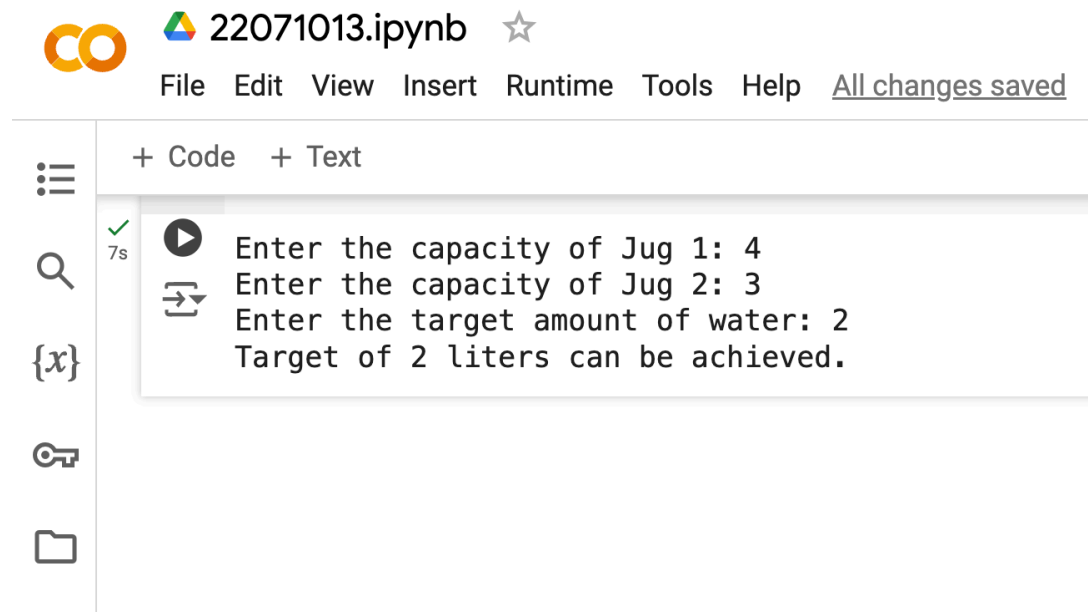
CODE:

```
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, there is a logo with two orange circles and the text "22071013.ipynb" followed by a star icon. Below this is a menu bar with the following items: File, Edit, View, Insert, Runtime, Tools, Help, and a link that says "All changes saved".

On the left side, there is a sidebar with icons for a menu (three horizontal lines), a search (magnifying glass), a variable (curly braces with an x), a key, and a folder.

The main area of the notebook shows a code cell with a play button icon and a green checkmark with "7s" next to it. The output of the code is displayed in a text box:

```
Enter the capacity of Jug 1: 4
Enter the capacity of Jug 2: 3
Enter the target amount of water: 2
Target of 2 liters can be achieved.
```