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Section:BSAI 4A
Subject:Programming for AI
LAB TASK 3

Code:

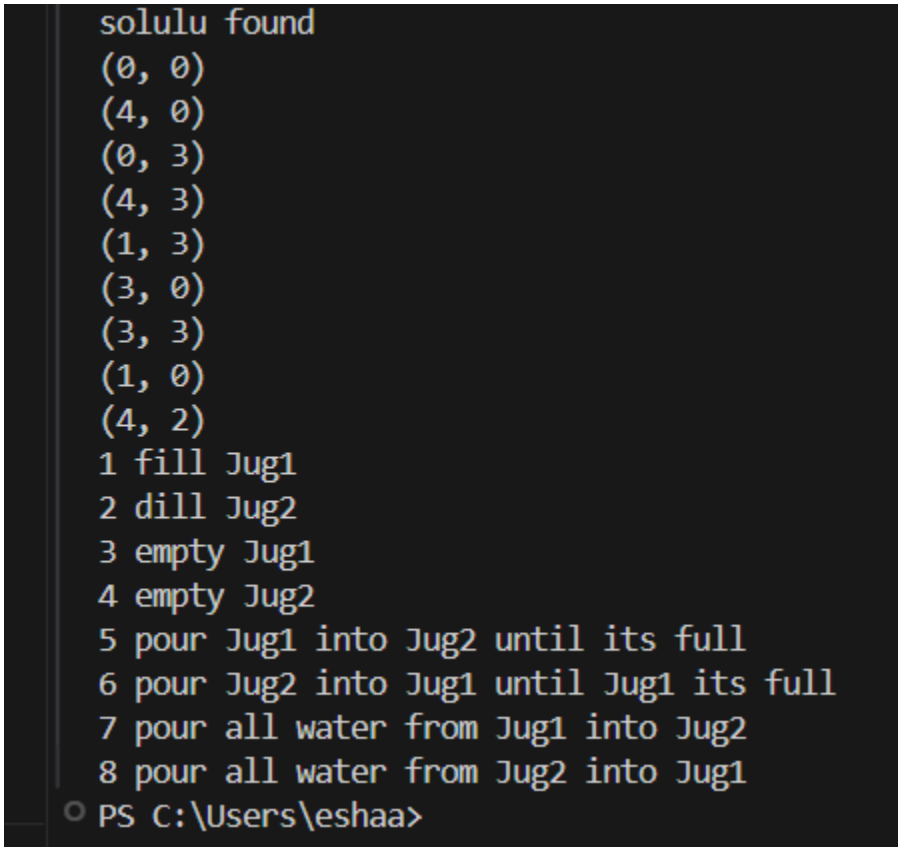
```
from collections import deque

# def waterJugProblem(capacity1, capacity2, goal):
#     queue =deque()
#     visited=set()

#     queue.append((0, 0))
#     visited.add((0, 0))

#     actions = []
#     while queue:
#         jug1, jug2 = queue.popleft()
#         actions.append((jug1, jug2))

#         if jug1 == goal or jug2 == goal:
#             print("solulu found")
#             for action in actions:
```

```
#                 print(action)

#             print("1 fill Jug1")
#             print("2 dill Jug2")
#             print("3 empty Jug1")
#             print("4 empty Jug2")
#             print("5 pour Jug1 into Jug2 until its full")
#             print("6 pour Jug2 into Jug1 until Jug1 its full")
#             print("7 pour all water from Jug1 into Jug2")
#             print("8 pour all water from Jug2 into Jug1")
#             return True

#         rules = [
#             (capacity1, jug2),
#             (jug1, capacity2),
#             (0, jug2),
#             (jug1, 0),
#             (jug1 - min(jug1, capacity2 - jug2), jug2 + min(jug1, capacity2 - jug2)),
#             (jug1 + min(jug2, capacity1 - jug1), jug2 - min(jug2, capacity1 - jug1)),
#             (jug1 + jug2 if jug1 + jug2 <= capacity2 else jug1 - (capacity2 - jug2),
#              jug2 + jug1 if jug2 + jug1 <= capacity2 else capacity2),
#             (jug1 + jug2 if jug1 + jug2 <= capacity1 else capacity1,
#              jug2 - (capacity1 - jug1) if jug2 + jug1 > capacity1 else 0),
#         ]
#         for state in rules:
#             if state not in visited:
#                 visited.add(state)
#                 queue.append(state)
#     print("solulu notfound")
#     return False
# jug1Capacity = 4
# jug2Capacity = 3
# target = 2
# waterJugProblem(jug1Capacity,jug2Capacity,target)
```

HOW AND WHY:

This is a water jug problem, so basically in this problem we use a series of steps where we fill and empty water between 2 jugs until we get the exact amount of water we need in 1 jug. For example if the question says you need to measure 2 liters with a 4 liter jug and a 3 liter jug, we will start by filling any 1 jug. Lets take the 3 liter jug we will fill it and

then pour it into the 4 liter jug, so our state becomes (3,0) from (0,0). Then we fill the 3 liter jug again and pour it into the 4 liter jug. Now the 4 liter jug is filled, so the state becomes (3,4). Now we will empty the 4 liter jug and pour the 3 liter jug into the 4 liter jug. Then we fill the 3 liter jug again and pour it into the 4 liter jug. Now the 4 liter jug is full, and the 3 litre jug contains exactly 2 liters. This is how we reach the end of this problem.



In this code we start by our initial state which is (0,0) as we fill and empty the jugs using and of the main 8 rules we reach to our solution.