```
from collections import defaultdict

def initialize_visited():
    return defaultdict(lambda: False)

def water_jug_problem(jug1, jug2, aim, visited, amt1=0, amt2=0):
    if (amt1, amt2) == (aim, 0):
        print(amt1, amt2)
        return True
    if visited[(amt1, amt2)]:
        return False
    visited[(amt1, amt2)] = True
    print(amt1, amt2)
    if amt1 < jug1:
        if water_jug_problem(jug1, jug2, aim, visited, jug1, amt2):
            return True
    if amt2 < jug2:
        if water_jug_problem(jug1, jug2, aim, visited, amt1, jug2):
            return True
    if amt1 > 0:
        if water_jug_problem(jug1, jug2, aim, visited, 0, amt2):
            return True
    if amt2 > 0:
        if water_jug_problem(jug1, jug2, aim, visited, amt1, 0):
            return True
    if amt1 > 0 and amt2 < jug2:
        pour_amt = min(amt1, jug2 - amt2)
        if water_jug_problem(jug1, jug2, aim, visited, amt1 - pour_amt, amt2 + pour_amt):
            return True
    if amt2 > 0 and amt1 < jug1:
        pour_amt = min(amt2, jug1 - amt1)
        if water_jug_problem(jug1, jug2, aim, visited, amt1 + pour_amt, amt2 - pour_amt):
            return True
    return False


jug1, jug2, aim = 4, 3, 1
visited = initialize_visited()
print("Actions")
print("J1 J2")
water_jug_problem(jug1, jug2, aim, visited)
```

```
Actions
J1 J2
0 0
4 0
4 3
0 3
3 0
3 3
4 2
0 2
2 0
2 3
4 1
0 1
1 0
True
```

```
jug1, jug2, aim = 4, 3, 2
visited = initialize_visited()
print("Actions")
print("J1 J2")
water_jug_problem(jug1, jug2, aim, visited)
```

```
Actions
J1 J2
0 0
4 0
4 3
0 3
3 0
3 3
4 2
0 2
2 0
True
```