

Program-6:

You are given two jugs, a 4-litre one and a 3-litre one. Neither has any measuring marker on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 litres of water into 4-litre jug? Implement this using Depth First Search.

```
print("Water Jug Problem")
x=0
y=0
print("Start state: (x,y)=(0,0)")
while True:
    rno=int(input("Enter the Rule No"))
    #Fill 4-gallon jug
    if rno==1:
        if x<4:
            print("Fill 4-gallon jug")
            x=4

    #Fill 3-gallon jug
    if rno==2:
        if y<3:
            print("Fill 3-gallon jug")
            y=3

    #Empty 4-gallon jug
    if rno==3:
        if x>0:
            print("Empty 4-gallon jug")
            x=0

    #Empty 3-gallon jug
    if rno==4:
        if y>0:
            print("Empty 3-gallon jug")
            y=0

    #Pour water from 3-gallon jug into 4-gallon jug until 4-
    gallon jug is full
    if rno==5:
        if x+y>= 4 and y>0:
            print("Pour water from 3-gallon jug into 4-
            gallon jug until 4-gallon jug is full")
            x,y=4,y-(4-x)

    #Pour water from 4-gallon jug into 3-gallon jug until 3-
    gallon jug is full
    if rno==6:
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        if x+y>=3 and x>0:
            print("Pour water from 4-gallon jug into 3-
gallon jug until 3-gallon jug is full")
            x,y=x-(3-y),3

#Pour all water from 3-gallon jug into 4-gallon jug
if rno==7:
    if x+y<=4 and y>0:
        print("Pour all water from 3-gallon jug into 4-gallon jug")
        x,y=x+y,0

#Pour all water from 4-gallon jug into 3-gallon jug
if rno==8:
    if x+y<=3 and x>0:
        print("Pour all water from 4-gallon jug into 3-gallon jug")
        x,y=0,x+y

#Pour 2 gallon water from 3 gallon jug into 4 gallon jug
if rno==9:
    print("Pour 2 gallon water from 3 gallon jug into 4 gallon jug"
)
    x,y=y,0

print("X =" ,x)
print("Y =" ,y)
print(f"State=({x},{y})")

#Break if 4 gallon jug contains 2 gallon water
if (x==2):
    print(" The result is a Goal state")
    break

#Iteration 1: Apply Rule 2
#Iteration 2: Apply Rule 7
#Iteration 3: Apply Rule 2
#Iteration 4: Apply Rule 5
#Iteration 5: Apply Rule 3
#Iteration 6: Apply Rule 9

```

Output:

Water Jug Problem

Start state: $(x,y)=(0,0)$

Enter the Rule No2

Fill 3-gallon jug

$X = 0$

$Y = 3$

State= $(0,3)$

Enter the Rule No7

Pour all water from 3-gallon jug into 4-gallon jug

$X = 3$

$Y = 0$

State= $(3,0)$

Enter the Rule No2

Fill 3-gallon jug

$X = 3$

$Y = 3$

State= $(3,3)$

Enter the Rule No5

Pour water from 3-gallon jug into 4-gallon jug until 4-gallon jug is full

$X = 4$

$Y = 2$

State= $(4,2)$

Enter the Rule No3

Empty 4-gallon jug

$X = 0$

$Y = 2$

State= $(0,2)$

Enter the Rule No9

Pour 2 gallon water from 3 gallon jug into 4 gallon jug

$X = 2$

$Y = 0$

State= $(2,0)$

The result is a Goal state