***Water jug problem:***

Problem statement: how you can get 2 gallon of water in 4 of gallon of jug?

1. You are given two jugs a 4 gallon and 3 gallons.
2. Neither jug has measuring mark on it.
3. A pump which has unlimited water, which you can use to fill the jug and the ground on which water may be poured.

**Solution:** (Using state space search)

* Each state is represented by tuple (x,y)
* x represents gallons of water in 4gallon jug
* y represents gallons of water in 3 gallon jug
* Initial state(0,0)
* Final state(2,\_)

**Set of operations that can be performed on a state:**

1. Fill a 4 gallon jug if x<4 (x,y)→(4,y)
2. Fill a 3 gallon jug if y<3 (x,y)→(x,3)
3. Empty 4 gallon jug on ground if x>0 (x,y)→(0,y)
4. Empty 3 gallon jug on ground if y>0 (x,y)→(x,0)
5. Pour water from 3-gal jug to fill 4- gal jug if 0<(x+y)≥4 and y>0 (x,y)→(4,y-(4-x))
6. Pour water from 4-gal jug to fill 3-gal jug if 0<(x+y)≥3 and x>0 (x,y)→(x-(3-y),3)
7. Pour all water from 3-gal jug into 4-gal jug if 0<(x+y)≤4 and y≥0 (x,y)→(x+y,0)
8. Pour all water from 4-gal jug into 3-gal jug if 0<(x+y)≤3 and x≥0 (x,y)→(0,x+y)

Program: x = 0  
y = 0  
m = 4  
n = 3  
print(**"Initial state = (0,0)"**)  
print(**"Capacities = (4,3)"**)  
print(**"Goal state = (2,y)"**)  
while x != 2:  
 r = int(input(**"Enter rule"**))  
 if(r == 1):  
 x = m  
 elif(r == 2):  
 y = n  
 elif(r == 3):  
 x = 0  
 elif(r == 4):  
 y = 0  
 elif(r == 5):  
 t = n - y  
 y = n  
 x -= t  
 elif(r == 6):  
 t = m - x  
 x = m  
 y -= t  
 elif(r == 7):  
 y += x  
 x = 0  
 elif(r == 8):  
 x += y  
 y = 0  
 print (x, y)