WATER JUG PROBLEM-BFS

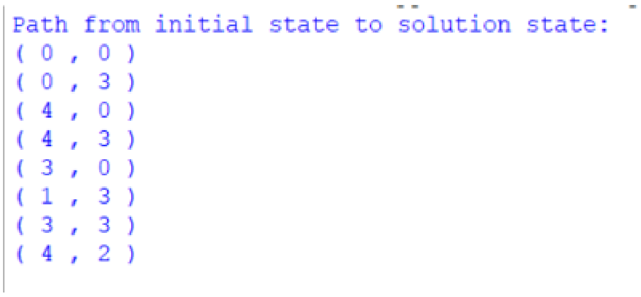
PROGRAM:

```
from collections import deque

def BFS(a, b, target):

m = {}

isSolvable = False

path = []


PRINCIPLES OF ARTIFICIAL INTELLIGENCE

q = deque()

q.append((0, 0))


while len(q) > 0:

u = q.popleft() # Use popleft to get the first element (breadth-first)

if (u[0], u[1]) in m:

continue

if u[0] > a or u[1] > b or u[0] < 0 or u[1] < 0:

continue

path.append([u[0], u[1]])

m[(u[0], u[1])] = 1

if u[0] == target or u[1] == target:

isSolvable = True

if u[0] == target:

if u[1] != 0:

path.append([u[0], 0])

else:

if u[0] != 0:

path.append([0, u[1]])

sz = len(path)

for i in range(sz):

print("(", path[i][0], ",", path[i][1], ")")

return # Exiting the function after finding the solution

q.append([u[0], b])

q.append([a, u[1]])
```

```
for ap in range(max(a, b) + 1):

c = u[0] + ap

d = u[1] - ap

if c == a or (d == 0 and d >= 0):

q.append([c, d])

c = u[0] - ap

d = u[1] + ap

if (c == 0 and c >= 0) or d == b:
```

```
q.append([c, d])

q.append([a, 0])

q.append([0, b])


if not isSolvable:

print("No solution")


if __name__ == '__main__':

Jug1, Jug2, target = 4, 3, 2

print("Path from initial state to solution state:")

BFS(Jug1, Jug2, target)
```

OUTPUT:



```
Path from initial state to solution state:
( 0 , 0 )
( 0 , 3 )
( 4 , 0 )
( 4 , 3 )
( 3 , 0 )
( 1 , 3 )
( 3 , 3 )
( 4 , 2 )
```