

```
from collections import deque
```

```
def is_valid(Ml, Cl, Mr, Cr):  
    return (Ml >= 0 and Cl >= 0 and Mr >= 0 and Cr >= 0 and  
            (Ml == 0 or Ml >= Cl) and (Mr == 0 or Mr >= Cr))
```

```
def solve():  
    start = (3, 3, 0, 0, 'left')  
    goal = (0, 0, 3, 3, 'right')  
    moves = [(1,0), (2,0), (0,1), (0,2), (1,1)]  
    queue = deque([(start, [start])])  
    visited = {start}  
  
    while queue:  
        (Ml, Cl, Mr, Cr, boat), path = queue.popleft()  
        if (Ml, Cl, Mr, Cr, boat) == goal:  
            return path  
  
        for M,C in moves:  
            if boat == 'left':  
                new = (Ml-M, Cl-C, Mr+M, Cr+C, 'right')  
            else:  
                new = (Ml+M, Cl+C, Mr-M, Cr-C, 'left')  
            if is_valid(*new[:-1]) and new not in visited:  
                visited.add(new)  
                queue.append((new, path+[new]))  
  
    return None
```

```
solution = solve()  
for step in solution: print(step)
```

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Python 2.7.6 (default, Nov 10 2013, 19:24:24) [MSC v.1500 64 bit (AMD64)] on win32

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>>> ===== RESTART =====

>>>

(3, 3, 0, 0, 'left')

(3, 1, 0, 2, 'right')

(3, 2, 0, 1, 'left')

(3, 0, 0, 3, 'right')

(3, 1, 0, 2, 'left')

(1, 1, 2, 2, 'right')

(2, 2, 1, 1, 'left')

(0, 2, 3, 1, 'right')

(0, 3, 3, 0, 'left')

(0, 1, 3, 2, 'right')

(1, 1, 2, 2, 'left')

(0, 0, 3, 3, 'right')