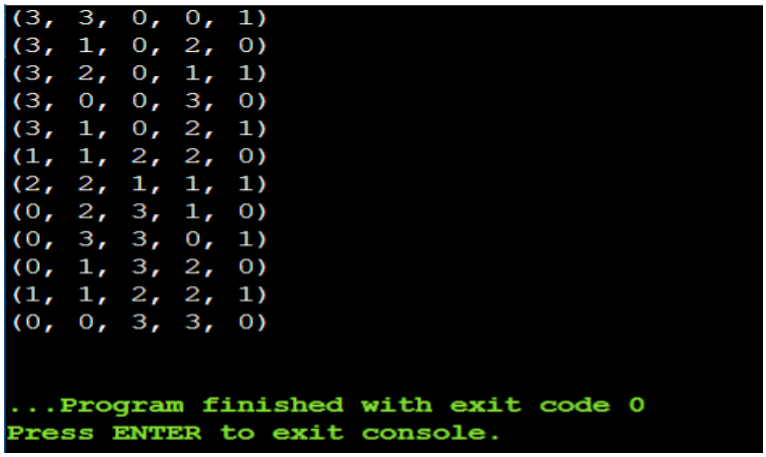
EXPERIMENT:05 Write the python program for Missionaries Cannibal problem

PROGRAM:

```
from collections import deque


def is_valid(m1, c1, m2, c2):
    return (m1==0 or m1>=c1) and (m2==0 or m2>=c2)
def solve():
    start = (3,3,0,0,1)  # (M_left, C_left, M_right, C_right, boat_side)
    goal = (0,0,3,3,0)
    q = deque([(start, [])])
    visited = set()
    moves = [(1,0),(2,0),(0,1),(0,2),(1,1)]
    while q:
        state, path = q.popleft()
        if state in visited: continue
        visited.add(state)
        if state[:4] == goal[:4]:
            for step in path+[state]: print(step)
            return
        m1,c1,m2,c2,side = state
        for dm,dc in moves:
            if side:  # boat on left
                nm1, nc1, nm2, nc2, ns = m1-dm, c1-dc, m2+dm, c2+dc, 0
            else:     # boat on right
                nm1, nc1, nm2, nc2, ns = m1+dm, c1+dc, m2-dm, c2-dc, 1
            if 0<=nm1<=3 and 0<=nc1<=3 and 0<=nm2<=3 and 0<=nc2<=3:
                if is_valid(nm1, nc1, nm2, nc2):
                    q.append(((nm1,nc1,nm2,nc2,ns), path+[state]))
solve()
```

OUTPUT:


(3, 3, 0, 0, 1)
(3, 1, 0, 2, 0)
(3, 2, 0, 1, 1)
(3, 0, 0, 3, 0)
(3, 1, 0, 2, 1)
(1, 1, 2, 2, 0)
(2, 2, 1, 1, 1)
(0, 2, 3, 1, 0)
(0, 3, 3, 0, 1)
(0, 1, 3, 2, 0)
(1, 1, 2, 2, 1)
(0, 0, 3, 3, 0)
...Program finished with exit code 0
Press ENTER to exit console.