EXPERIMENT-12

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Course: CSA1789 Artificial Intelligence

Q) Write the python program for Water Jug Problem

Program:

```
from collections import deque


def BFS(a, b, target):
    m = {}
    isSolvable = False
    path = []
    q = deque()

    q.append((0, 0))

    while (len(q) > 0):


        u = q.popleft()

        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], ",",
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                    path[i][1], ")")
                break


            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: