PRACTICAL 2

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Aim:	You are given two jugs with m litres and a n litre capacity. Both the jugs are initially empty. The jugs don't have markings to allow measuring smaller quantities. You have to use the jugs to measure d litres of water where d is less than n.				

Program

```
from collections import deque


def water_jug_BFS(x, y, z):
    visited = set()
    queue = deque([((0, 0), [])])

    while queue:
        (jug_a, jug_b), actions = queue.popleft()

        if jug_a == z or jug_b == z or jug_a + jug_b == z:
            return actions + ["Success"], True

        if (jug_a, jug_b) in visited:
            continue

        visited.add((jug_a, jug_b))

        # Fill jug A
        if jug_a < x:
            queue.append(((x, jug_b), actions + ["Fill A"]))

        # Fill jug B
        if jug_b < y:
            queue.append(((jug_a, y), actions + ["Fill B"]))
```

```
        # Empty jug A
        if jug_a > 0:
            queue.append(((0, jug_b), actions + ["Empty A"]))

        # Empty jug B
        if jug_b > 0:
            queue.append(((jug_a, 0), actions + ["Empty B"]))

        # Pour from A to B
        if jug_a + jug_b >= y:
            queue.append(((jug_a - (y - jug_b), y), actions + ["Pour A to B"]))
        else:
            queue.append(((0, jug_a + jug_b), actions + ["Pour A to B"]))

        # Pour from B to A
        if jug_a + jug_b >= x:
            queue.append(((x, jug_b - (x - jug_a)), actions + ["Pour B to A"]))
        else:
            queue.append(((jug_a + jug_b, 0), actions + ["Pour B to A"]))

    return [], False

if __name__ == "__main__":
    n = int(input("Enter jug A's capacity (n): "))
    m = int(input("Enter jug B's capacity (m): "))
    d = int(input("Enter capacity to measure (d): "))

    actions, result = water_jug_BFS(n, m, d)

    if result:
```

```
    print("The sequence of actions is:")
    for action in actions:
        print(action)
else:
    print("No solution found.")
```

Output

```
Enter jug A's capacity (n): 4
Enter jug B's capacity (m): 3
Enter capacity to measure (d): 2
The sequence of actions is:
Fill B
Pour B to A
Fill B
Pour B to A
Success
```

```
Enter jug A's capacity (n): 6
Enter jug B's capacity (m): 2
Enter capacity to measure (d): 5
No solution found.
```