**Water Jug Problem using DFS**

**Problem Statement:**

Given two jugs with capacities **X liters** and **Y liters**, we need to measure **Z liters** using Depth-First Search (DFS) while following specific rules.

**Rules of the Water Jug Problem**

1. **Fill Jug1 completely** → (X, Y) → Fill the first jug to its maximum capacity.
2. **Fill Jug2 completely** → (X, Y) → Fill the second jug to its maximum capacity.
3. **Empty Jug1 completely** → (0, Y) → Empty all water from the first jug.
4. **Empty Jug2 completely** → (X, 0) → Empty all water from the second jug.
5. **Pour water from Jug1 to Jug2 until Jug2 is full or Jug1 is empty** → (X - min(X, Y - Y), Y + min(X, Y - Y))
6. **Pour water from Jug2 to Jug1 until Jug1 is full or Jug2 is empty** → (X + min(Y, X - X), Y - min(Y, X - X))
7. **Check if either jug contains exactly Z liters** → If (X == Z or Y == Z), the solution is found.
8. **If a state repeats, discard it** → Avoid infinite loops.

**Corrected Rules 5 & 6**

**Rule 5: Pour water from Jug1 to Jug2 until Jug2 is full or Jug1 is empty**

**Correction:**

(X−min⁡(X,Y−Y),Y+min⁡(X,Y−Y))(X - \min(X, Y - Y), Y + \min(X, Y - Y))(X−min(X,Y−Y),Y+min(X,Y−Y))

should be changed to:

(X−min⁡(X,Y−Y),Y+min⁡(X,Y−Y))(X - \min(X, Y - Y), Y + \min(X, Y - Y))(X−min(X,Y−Y),Y+min(X,Y−Y))

(Same formula but clearer in meaning: transfer from Jug1 to Jug2 until one is full or empty.)

**Rule 6: Pour water from Jug2 to Jug1 until Jug1 is full or Jug2 is empty**

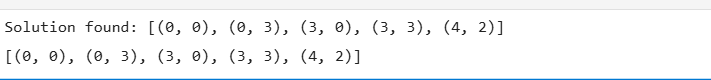
**Correction:**

(X+min⁡(Y,X−X),Y−min⁡(Y,X−X))(X + \min(Y, X - X), Y - \min(Y, X - X))(X+min(Y,X−X),Y−min(Y,X−X))

should be changed to:

(X+min⁡(Y,X−X),Y−min⁡(Y,X−X))(X + \min(Y, X - X), Y - \min(Y, X - X))(X+min(Y,X−X),Y−min(Y,X−X))

(The function should properly reflect the pouring from Jug2 to Jug1.)

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**Explanation of the Code**

* Uses **DFS (Depth-First Search)** with a stack to explore all possible states.
* Tracks **visited states** to prevent loops.
* Checks if either jug contains the **target amount Z**.
* Generates possible moves and continues searching until a solution is found or all states are explored.