**Missionaries and Cannibals**

The "Missionaries and Cannibals" problem is a classic problem in artificial intelligence and problem-solving. Here’s a brief overview:

**Problem Description**

Three missionaries and three cannibals need to cross a river using a boat that can carry at most two people. The challenge is to find a solution where no missionary is left in one place with more cannibals than missionaries (otherwise, the cannibals will eat them).

**Rules**

1. The boat can carry a maximum of two people at a time.
2. At any point, if the number of cannibals is greater than the number of missionaries on either side of the river, the cannibals will eat the missionaries.
3. All six individuals (missionaries and cannibals) and the boat must cross the river.

**Solution Approach**

This problem is often solved using a state-space search algorithm, where each state represents a configuration of missionaries and cannibals on each side of the river, as well as the boat's position.

**Steps to Solve**

1. **Define the State:** Each state can be defined by the number of missionaries and cannibals on the starting side of the river, and whether the boat is on the starting side or the other side.
2. **Define the Actions:** Actions include moving one or two people from one side to the other.
3. **Define the Goal State:** The goal is to get all the missionaries and cannibals to the other side of the river without violating the rules at any point.
4. **Search Strategy:** Use breadth-first search, depth-first search, or other search algorithms to explore all possible states and actions until the goal state is reached.

**Example Solution**

A step-by-step solution involves keeping track of the state transitions and ensuring that the safety conditions are met at each step. Here's one possible sequence of moves:

1. **Move 2 Cannibals to the other side.** (State: 3M, 1C | 0M, 2C | Boat on the other side)
2. **Move 1 Cannibal and 1 Missionary back.** (State: 3M, 2C | 1M, 1C | Boat on the starting side)
3. **Move 2 Cannibals to the other side.** (State: 3M, 0C | 1M, 3C | Boat on the other side)
4. **Move 2 Cannibals back.** (State: 3M, 2C | 1M, 1C | Boat on the starting side)
5. **Move 2 Missionaries to the other side.** (State: 1M, 2C | 3M, 1C | Boat on the other side)
6. **Move 1 Cannibal and 1 Missionary back.** (State: 2M, 3C | 2M, 0C | Boat on the starting side)
7. **Move 2 Cannibals to the other side.** (State: 2M, 1C | 2M, 2C | Boat on the other side)
8. **Move 1 Cannibal and 1 Missionary back.** (State: 3M, 2C | 1M, 1C | Boat on the starting side)
9. **Move 2 Cannibals to the other side.** (State: 3M, 0C | 1M, 3C | Boat on the other side)
10. **Move 2 Cannibals back.** (State: 3M, 2C | 1M, 1C | Boat on the starting side)
11. **Move 2 Missionaries to the other side.** (State: 1M, 2C | 2M, 0C | Boat on the other side)
12. **Move 1 Cannibal and 1 Missionary back.** (State: 2M, 3C | 1M, 1C | Boat on the starting side)
13. **Move 2 Cannibals to the other side.** (State: 2M, 1C | 1M, 3C | Boat on the other side)
14. **Move 2 Cannibals back.** (State: 2M, 2C | 1M, 2C | Boat on the starting side)
15. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
16. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
17. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
18. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
19. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
20. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
21. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
22. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
23. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
24. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
25. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
26. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
27. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
28. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
29. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)
30. **Move 2 Cannibals back.** (State: 2M, 1C | 1M, 2C | Boat on the starting side)
31. **Move 2 Cannibals to the other side.** (State: 2M, 0C | 1M, 3C | Boat on the other side)

After these moves, all missionaries and cannibals are successfully transported across the river without any being eaten.