**Methodology:**

Overall experiment: Tested with 3 of the test cases provided in the assignment. Additional test cases are done by swapping the start and goal file, also some arbitrary test case where the number of chickens is larger or equal to the number of wolves.

BFS – We run the search problem on all 3 of the test cases. They all come out to reach the goal state with no problem. Other than the 3 test cases, we also tried to flip around the initial file and goal file of the first test case to see if the algorithm works the other way around. The type of iteration we used in the BFS is FIFO which we push a generated state to the end of the frontier and pop a state at the front for each iteration until we found the goal state or the frontier is empty. There is no particular parameter used in this search except passing in the initial state and check it with goal state.

DFS – This search algorithm is also run the same experiments as BFS. It is performed by an auxiliary death limited search(dls) function. Which we pass in an INT\_MAX as the limit parameter for the dls function. That way, we mimic an infinite depth which happens while performing DFS.

IDDFS – As above, same experiment is done for this search algorithm. It is done by iterating through current limit and pass it to the same dls function used in DFS until current limit reach INT\_MAX (again mimicking infinite depth).

ASTAR – The same overall experiment was performed. The heuristic function we used in the astar algorithm is by calculating the least amount of move required to transfer all the animals from one side to the other ignoring the rules. By running test for test cases that contain only chickens, we found that there is a relationship between the minimum move and the total number of chickens. That is, if the number of chickens is smaller than 3, the shortest path to take all chickens to the other bank will be 1, otherwise, the shortest path will be 3 + (number of chickens – 3) \* 2. Using this pattern, we then apply it to our heuristic, replacing the number of chickens with the number of wolves. Since the heuristic calculate the shortest path to move all animals from one bank to the other, it is always optimistic and never overestimate. Therefore, our heuristic used in this astar function is admissible.

**Result:**

**Discussion:**

**Conclusion:**