**Lab 3 Instructions**

In today’s lab you will solve the “wolf, cabbage, goat” puzzle. Recall that the puzzle is –

* Once upon a time a farmer went to a market and purchased a wolf, a goat, and a cabbage.
* On his way home, the farmer came to the bank of a river and rented a boat. But crossing the river by boat, the farmer could carry only himself and a single one of his purchases: the wolf, the goat, or the cabbage.
* If left unattended together, the wolf would eat the goat, or the goat would eat the cabbage.
* The farmer's challenge was to carry himself and his purchases to the far bank of the river, leaving each purchase intact. How did he do it?

Note that there are four entities - the farmer, the wolf, the goat and the cabbage. Any combination of them can be at the left bank and the remaining ones will be on the right bank. This observation will help you to solve the problem.

Your tasks are as follows:

1. Define the states of the problem – on pen and paper
2. Define the possible legal actions for transforming the states – on pen and paper
3. Define a data structure for representing the states
4. Define the initial state – in the representation chosen by you

* Call this state as the current\_state

1. Define the goal state – in the representation chosen by you
2. Apply the available actions and generate a set of child states of the current\_state
3. Mark the current state as *visited*
4. For all child states of the current\_state

Check if the child state is allowed by the problem constraints

If yes – check if the child state is a goal state

If yes – print “goal reached” and stop

If no – check if the child state is marked as visited

If no – add the child state in a queue

1. Get a state from the queue – call it the current\_state
2. Go to step 6

**Show your work, even if it is partial, during the lab hour since every lab is being graded.**