# CS 461 – ARTIFICIAL INTELLIGENCE

## HOMEWORK #1 (5%)

Assigned: Tue Feb 16, 2016

Due: Fri Feb 26, 2016, 12:00 noon

You can do this homework in groups of 3 or less. More importantly, your group for this homework may simply coincide with your term project group. In any case, do not forget to indicate the names of students submitting the homework (i.e., at most 3 names).

A submission consists of hardcopy listing of your program + all solutions (complete paths) + the table mentioned below. Each member of a group should also put, ON THE 27TH (THAT IS, ONE DAY AFTER THE DEADLINE), an electronic copy of these on their Moodle blog (clearly, the exact same copy).

You can submit your homework (just a single submission for each group) to one of our TAs (Muhammed Alser and Iman Deznabi).

Feel free to use any programming language as long as you can give a demo if requested.

### Problem

(The following statement is excerpted verbatim from Saul Amarel’s [“On the Representation of Problems and Goal-Directed Procedures for Computers”](http://link.springer.com/chapter/10.1007%2F978-3-642-99976-5_8). However, you don’t have to read this paper in order to do the homework.)

Three missionaries and three cannibals seek to cross a river. A boat is available which will hold two people, and which can be navigated by any combination of missionaries and cannibals involving one or two people. If the missionaries on either bank of the river, or 'en route' in the river, are outnumbered at any time by cannibals, the cannibals will indulge in their anthropophatic tendencies and do away with the missionaries. Find the simplest schedule of crossings that will permit all the missionaries and cannibals to cross the river safely.

You are asked to solve this problem using nondeterministic search. First, design a useful and natural state-space representation for this problem. Run your algorithm 1,000 times and tabulate which goal is found with what frequency. (You may want to solve the problem manually first to determine the number of goals.)

#### Cheat sheet: Don’t look at [this](http://www.cs.utexas.edu/~novak/miscan.gif) (or [this](http://www.oswego.edu/~tnutting/csc416/hw6/Untitled.jpg)) unless you are stuck!