UNIVERSITY OF MINNESOTA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

5511 ARTIFICIAL INTELLIGENCE I FALL 2017

PROGRAMMING ASSIGNMENT (100 points)
Assigned: 11/03/17 Due: 12/05/17

The programming assignment consists of the following problems:

- (50 points) Write Lisp code that solves the missionaries and cannibals problem assuming that you have one boat, and 15 cannibals and 15 missionaries. Assume that the boat can carry at most six people and there is a single boat available. You cannot also have the boat moving with no one onboard. The cannibals should never outnumber the missionaries (either on the boat or at both sides of the river). You can write your own code or modify the code from the Russell's web site to solve the problem. You need to printout the sequence of moves leading to a correct solution. Try the same problem with 24 cannibals and 24 missionaries. **You should not hard-code your solution**.
- (50 points) Implement the A* search for searching trees (in Lisp). Do not use Russell's code or other code from the web. Implement a counter that counts the number of nodes expanded and prints this number at the end of the search. Use your code to solve the 8-puzzle problem with the heuristic being the number of misplaced tiles and start state $((E, 1, 3), (4, 2, 5), (7, 8, 6))$. The goal state is: $((1, 2, 3), (4, 5, 6), (7, 8, E))$. Print the number of nodes expanded. You only need to show the states generated during the search process. Your code should detect **infeasible puzzles**. For an infeasible puzzle run your code and submit the results as well.

Sample Lisp code for the first problem can be found at the web resources (ref [2]) listed in the syllabus.

All the programs must be written in Lisp (follow the instructions discussed in class and at the web site of the class). You need to submit: **a) a hardcopy (code, script, report) and b) an electronic copy through Moodle (code, script)**. You must also satisfy the following guidelines: Please hand in a report that contains a Title Page (including your name, login, ID number, class number and/or name, the professor's name, the assignment number and/or name, location and name of the files (source, executable, data, make, etc.), and the date due), a Program Implementation Description, Known Bugs and Deficiencies, Style Guidelines, Terminal Session Script and Source Code. At the web site, you will find instructions on how to use Moodle to submit your programs. The rough weight distribution for the assignment is: Correctness-60%, Report-20%, Style-10%, and Innovations-10%. You should work on this assignment individually and not in groups.

Finally, I suggest that you begin the assignment as early as possible.