

CS 461 – ARTIFICIAL INTELLIGENCE

HOMEWORK #1 (6.5% OR 13 POINTS)

Assigned: **Wed 3 Feb 2021**

Due: **Wed 17 Feb 2021 ** 2 pm ****

*Your group for this homework should coincide with your term project group. In any case, indicate clearly the members who are submitting the homework. Your contact person must upload the solution (along with all the original code written) to Moodle. Just a single submission per group! **Our TAs will soon send you a note explaining the mechanics of submissions.***

Any programming language can be used as long as you have it up-and-running on your computer. Any group member should be prepared to give a demo (using their own computer) when requested to do so by our TAs.

In this homework, you'll solve a variant of the following classical puzzle:¹

MISSIONARIES & CANNIBALS: A group consisting of 3 cannibals and 3 missionaries seeks to cross a river. A boat is available which will hold up to 2 people. If the missionaries on either side of the river are outnumbered at any time by the cannibals on that side, even momentarily, the cannibals will do away with the unfortunate, out-numbered missionaries. What schedule of crossings can be devised to permit the entire party to cross safely? (Assume that the group and the boat are on the west bank initially and that they would like to end up on the east bank eventually.)

The instance you'll solve (by implementing a program) is as follows:

There are 6 cannibals, 6 missionaries, and a boat holding 5.

Your program must use Nondeterministic Search (Winston, Chapter 4). It must check for **repeated** states. Explain, in painstaking detail, how you've implemented nondeterminism and how you've avoided paths with loops.

What should be the output of your program? Some such sequence of moves resembling the following will be just fine (N.B. the following solution is for the classical version, viz. 3 cannibals, 3 missionaries, and a boat holding 2):

¹ See the reference on the next page for a solution. (Obviously, you should first try to come up with your own solution. Study the reference only after that.)

Late submissions will first have 2 points deducted categorically. Then they'll have 1 point deducted for every late day. (A new day begins at midnight.)