

CISC 3410 Fall 2012, Homework 2

1. The *Towers of Hanoi* problem:

"In a Tibetan monastery, there are 3 columns and 64 golden rings. The rings are of different sizes and rest over the columns. At the beginning of time, all the rings rested on the leftmost column, and since then, the monks have been moving the rings 1-by-1 between columns. The monks must obey two rules:

- (a) They may only move one ring at a time between columns.
- (b) No ring may rest upon a smaller ring."

The 64 ring Hanoi problem is hard (and very very slow to solve). We will consider a small version of the problem using 3 rings (see Figure 1).

Write down the search tree for the 3-ring problem using:

- (a) depth limited search to depth 3;
- (b) iterative deepening to depth 4;

Next, formulate a path cost function and an admissible heuristic for the problem, and use these to write down the search tree that is generated by the following kinds of search:

- (c) uniform cost search;
- (d) greedy search;
- (e) A* search.

You should write down one tree for each kind of search, and indicate on the trees the order in which the nodes are expanded.

For uniform cost search, you need only expand the tree to depth 4, but for greedy and A* search, you need to expand the tree until the goal is found.

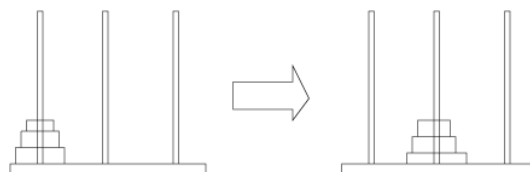


Figure 1: The 3 Ring Towers of Hanoi Problem