CS 5600 – Course Crasher: Dave Brown, 9/2, 9/7, and 9/9/2016

✠ **Key Ideas:**

Heuristics can mitigate the combinatorial explosion. A *heuristic* is* a formalization of an intuition used to make decisions quickly or find solutions efficiently. A concession is that the decisions may be bad, and the solutions may be approximate. There is sometimes no getting around the combinatorial explosion.

Representations of problems may (practically or almost) solve problems. A representation may not only speed up or slow down computations, but may also obfuscate or elucidate a solution.

Hackers versus computer scientists. Computer scientists contribute to their discipline and to science writ large. Hackers contribute the computer they work on or the company they work for. Both hackers and computer scientists should be mindful of how their findings, advancements, or solutions impact life.

✠ **Homework Problems:**

1. **The Cannibals and Missionaries Problem.** Three cannibals and three missionaries are standing together on the West side of a river bank. A boat is available that will hold up to two people. If the missionaries are ever outnumbered, on the bank or in the boat, the cannibals will eat them. Please generate a procedure to get the six people to the East side of the river bank (alive and uneaten).

2. **Avoid Static Evaluations in an Adversarial Search.** Consider a full binary tree with depth 4 (so $2^4 = 16$ terminal nodes and every non-terminal node has two children) and terminal nodes with static values, from left to right, $6, 2, 3, 3, 3, 9, 4, 7, 2, 2, 0, 4, 6, 8, 4, 6$.

   (a) Assume the root node is a minimizer (so the parents of the terminal nodes are maximizers), and explore the tree using the alpha-beta search-and-pruning procedure from left to right. Indicate all parts of the tree that are cut off, all static values that do not need to be calculated, and the winning path or paths.

   (b) Repeat the above with the terminal nodes labeled in reverse order (equivalently, executing the alpha-beta procedure from right to left).

   (c) Please make observations about the effect the ordering of nodes has on alpha-beta procedure. (Remember that the static values are not known and are assumed to be expensive to determine in practice. So any ordering of the nodes would have to be done by some sort of oracle; this exercise is intended to illustrate that the alpha-beta may or may not save much computation.)

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*Please don't regard this as an official definition; I don't know the official definition. I do know that the term is used differently in computer science than the way it is defined in some dictionaries.