

CS 441/541
Artificial Intelligence
Fall, 2008

Homework 3:
Game-Playing

Due: Wednesday Oct. 22.

The game of Nim (also called Tactix) is played by the following rules: Starting with one or more piles (heaps) of one or more pieces each, players alternate by taking all or some of the pieces in a single heap. The player taking the last piece is the loser.

For example, the picture below illustrates a starting position with four heaps, with one, three, five, and seven pieces respectively. Players alternate in removing a number of pieces from a chosen heap. The number of pieces chosen to remove must be greater than zero, and less than or equal to the number of pieces in the heap.



Your assignment is to write a program that plays Nim, using minimax search with alpha-beta pruning of the complete game tree. (This is feasible only for small instances of Nim.) The value of a leaf node is 1 if it is a win (for the computer) or 0 if it is a loss (for the computer).

The input to your program will be three arguments: the number of piles, an initial Nim configuration, and the player that will go first (computer or opponent). At each turn, your program should print its own move on the screen or prompt the opponent for his or her move.

You may either adapt the minimax and alpha-beta pruning code given in the textbook or write it from scratch in the programming language of your choosing.

What to hand in: E-mail me an electronic version of your code with instructions on how to compile and run it. No hardcopy writeup is necessary for this assignment.