FALL 2016 Final Project- CECS 174

DUE DATE: DECEMBER 7th, 2016

The game of Nim

A. Introduction: This is a well-known game with a number of variants. The following variant has an interesting winning strategy. Two players alternately take marbles from a pile. In each move, a player chooses how many marbles to take. The player must take at least one but at most half of the marbles. Then the other player takes a turn. The player who takes the last marble loses.

B. Coding: Write a program in which the computer plays against a human opponent.

C. Guidelines:

1) Generate a random integer between 10 and 100 to denote the initial size of the pile.

2) Generate a random integer between 0 and 1 to decide whether the computer or the human takes the first turn.

3) Generate a random integer between 0 and 1 to decide whether the computer plays smart or stupid.

(i) In stupid mode the computer simply takes a random legal value (between 1 and n/2) from the pile whenever it has a turn.

(ii) In smart mode the computer takes off enough marbles to make the size of the pile a power of two minus 1—that is, 3, 7, 15, 31, or 63.

NOTE: That is always a legal move, except when the size of the pile is currently one less than a power of two. In that case, the computer makes a random legal move.

Remark: You will note that the computer cannot be beaten in smart mode when it has the first move, unless the pile size happens to be 15, 31, or 63. Of course, a human player who has the first turn and knows the winning strategy can win against the computer.

D. Report:

a) Front page (your name, name of project and institution)

b) Introduction to the program.

c) Program analysis and algorithm design

- Pseudocode for the program
- Describe each method used in program (including the main method)
- Screenshots of all test cases

NOTE:

a. The program should use at least 4 methods

b. The project should consist of two py files: one contains methods and one contains game simulation.

c. There will be 5 points deduction for each logical error