National University of Computer & Emerging Sciences
Karachi Campus
Artificial Intelligence
Programming Assignment #2

Instructions ***Each Problem of 10 points***

Due Date: The assignment is due by May 10, 2017 till midnight.

Submission: The assignment has to be submitted via slate website submission. You must submit the source code files with proper naming convention for example (Assignment No. 1 Problem No. 1) you should give CS401-Kxxxxxx-A1P1.cpp. You should copies all questions for the assignment in a single folder (named as your id e.g. K1xxxxx) and zipped it before uploading to slate.

Sample Input and Output files: The sample input and output files are available from course website at slate. Make sure that you have tested your programs against all the available input files and EXACT output file is produced.

Connect-Four

It is a two player board game played for centuries around the world. The game involves the two players alternating turns. It consists of a grid with "c" columns and "r" rows. At each turn, a player drops a checker into the column of her choice. The game play continues until one of the players gets 4 checkers in a horizontal, vertical, or diagonal line. In this assignment you need to program an adversarial search strategy on a variation of connect-four with 6X4 grid.

The rules of the game are similar to standard version. Each player takes alternate turns dropping a checker into a column, a player cannot remove checkers from any column, a full column can not have any more checker. The game ends when a player places four one's own checkers next to each other vertically, horizontally or diagonally. A tie occurs if all player's checkers consumed or grid is fully occupied with checkers and no player has four consecutive checkers.

Board and Moves

The design of the board is your choice; an initial empty board has a value zero at each cell. The player one has a value 1 and player two has a 2 at each position where it placed it checker. Given a board position you need to decide whether it is a valid state or not. The move strategy is through generating all possible actions sequences given a state. The evaluation function is another challenge that you need to overcome. Your move will be evaluated the best as per the opponent possibilities using adversarial search techniques.

Computer Play

There are two parts of this assignment prepare the classes to manage the board and displaying move. The other part is to decide the move automatically. You need to prepare an adversarial search using both MiniMax and alpha-beta pruning. Starting from an initial board it will first decide who will move first. For a computer move it will search the game tree with MiniMax search or alpha-beta search. You can configure your program to use either as a configuration parameter. Alternate move will be entered by human player.

Coding Guide

You are allowed to program in C/C++ and Java Only. For each problem you need to submit one code file that should contains all the code. The code file should be named as CS401-Kxxxxxx-A1Px this is a main requirement for this assignment. Be careful while submitting the final assignment. There will be marks for following coding standards.

<The end>