

# CS180 Machine Problem 1:

## “Tic-Tac-Toe”

### 1 Introduction

Game playing has been around since the early days of artificial intelligence. The algorithm that has become the standard for the general two-player games is the Minimax. One of the simplest and most popular games where it has been applied is in the game of *Tic-Tac-Toe* (also known as *Noughts and Crosses* in some countries).

### 2 How to Play

The board consists of a three-by-three (3 x 3) matrix where each cell can be empty (“-”), can contain an “x” (Player 1), or an “o” (Player 2). Two players take turns marking each cell with their respective symbol until one of the players make three consecutive symbols horizontally, vertically, or diagonally, in which case the player wins. If the board becomes full and no player has won, the game is declared a draw (tie).

### 3 The Machine Problem

You will be implementing in ANSI C, the minimax algorithm **with alpha-beta pruning** to play the game of tic-tac-toe against a human player. The human player will be “x” (computer plays “o”) and will always be the one to make the first move. The computer cannot pass and must be able to make a move within a few seconds. You are free to implement any utility function (or evaluation function) you would like on the condition that it is implemented as a C function that accepts the board (char \*\*) as an argument and returns a numeric value (double or integer).

A template program (written in C) will be provided for you that will perform the rest of the functionalities for the tic-tac-toe playing game. All you need to do is provide the algorithm that will give the  $x$  and  $y$  coordinates for the computer’s move (this portion is indicated as a comment in the template). There is no need to modify the rest of the template.

### 4 Submission

Deadline for submission is on **August 3, 2012**, 1pm via email at [tmbasa@dcs.upd.edu.ph](mailto:tmbasa@dcs.upd.edu.ph). Deliverables include the softcopy of your program (complete with inline comments). You are required to schedule a demonstration/defense of your program within one week after the mid-term exam<sup>1</sup>. Good luck!

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<sup>1</sup>Consultation hours: M 1-5pm, TTh 1-3pm, WF 2:30-4pm, or upon appointment