Tic Tac Toe game in C++

Features:

* 3 x 3 grid, user uses keyboard keys to specify the position in the grid.
* Game gives error if user gives incorrect position (position that doesn’t exist or is already occupied)
* Game has a timer
* Maintains history of computer wins and losses
* Game has a defined start and end
* Game can be restarted or aborted
* In case where one opponent is computer it has to play intelligently to make the best move to win or at least draw

Non-MVP features

* Maintain history of wins and losses of all players
* Players must identify themselves before playing, new players can create unique identity
* Both opponents are computer

Other potential features

* Graphical user interface

# Plan

## Main features

Grid can be created using matrix or array.

Each number key will correspond to position on grid. When number is pressed the value in that position in the matrix will change to “X” or “O”. Create an if statement where a position can’t be changed if it already has an “X” or “O” in it, output an error and not change the grid.

Timer can be implemented using similar techniques as used in previous assignments. Record how long it takes user to execute move and minus that value from how much time each player is given at the start (2 minutes, etc)

History of computer wins and losses can be recorded to a file and referred to in later play sessions

Game starts with numbers in each position in grid. Game ends when all spots are full, one side wins, or the timer for one player runs out.

Game can be restarted by pressing a button, say, “R”. Could also be restarted by implementing a pause menu function and selecting restart from there.

Implement intelligent cpu player:

* One option is to create all possible board permutations and make the cpu pick the right option for each situation.
* Another option is for the cpu to be given 4 options for moves each turn and implement them in the following order of priority using if statements:
  1. The opponent is about to place three of their pieces in a row so block their next move
  2. The cpu is about to place three of their pieces in a row so place a piece in the appropriate spot
  3. The cpu has placed a single piece down so now place one adjacent to it (could be a random position based off of the options given)
  4. Place a piece randomly on the board
* Maybe there’s another option or two I’m missing but I can’t think of it right now

## Non-MVP features

Players will identify themselves when they begin game with a name. This name will be saved to a file and all player wins, losses and ties will be recorded after each game. When the player plays a game a check will be done to see if player has previously been identified. If they have then the file with their name tied to it will be accessed and their records will be read. After a game the player records will be shown.

There will be at least 2 cpu opponents. Each one will have their history saved to a file. One may be “Easy” and one “Hard” and their actions will be based off the priority list given previously, where the harder the cpu player the more closely it will follow the list.

## Other features

GUI can be basic text menus given the nature of this assignment