**Battleship Rules – Megan Lahm & Dylan Prince**

The classic game of Battleship is brought to you in the convenience of a console. The goal of the game is to sink the opponent’s 5 ships (which vary in size), by guessing coordinate locations on the board. Simultaneously, the opponent will also be guessing coordinates in order to sink your ships first.

Setup:

* The GUI consists of four sections, the top left is a visual of your opponent’s board. While you are not able to see where they have placed their ships, it allows you to see where you have guessed, including misses and hits of ships. The bottom left sector is your own board, this is where you will place your ships, and will see the guesses of your opponent. At the bottom right, various buttons are used to place your ships (specifying which ship and the direction it will be placed in). The top right sector is the message center, which updates where the AI (opponent) has moved.
* Before the game begins, you will be asked which difficulty of AI you wish to play against, ‘0’ being the AI that guesses sequentially, and is not intelligent, and ‘1’ and above being far more strategic opponents. Once this selection is made, the game will proceed.
* At the start of the game, you must place your ships on your board. This is done by selecting which ship you would like to place by clicking the respective button. Then, checking the orientation, you may choose to switch between horizontal and vertical. Now, you may click a location on your board, which will (if possible) place the selected ship in the designated direction, according to your preference. Your option will be shown before you click the location, by highlighting the location you hover over. Once the ships are placed, the opponent’s board will become active, and you may begin to guess.

Game Play:

* Guesses are made by clicking a peg location on the opponent’s board. If your guess is a hit, then the peg will change to be red, and you may continue guessing until you ‘miss’, which will change the peg to be white.
* You will be alerted when you have sunk an enemy’s ship
* The AI similarly will guess on your board, turning your pegs either red or white, depending on the result of the guess.
* When either you or the AI has sunk all the other’s ships, the game will be ‘over’.
* To begin another game, click the ‘reset’ button

**How the AI works – Megan Lahm & Dylan Prince**

AI 0:

* This AI is an unintelligent, brute force solution. It guesses in a sequential, row by row, column by column approach. Each turn it guesses the next available space, starting from the top left corner, going down each row, then skipping to the next column.

AI 1:

* The medium complexity AI works to find an ‘optimal’ placement for the guess. If there isn’t an optimal placement, a random spot on the board is chosen. It begins by randomly choosing a spot, then guesses all spaces surrounding the hit (this includes after a sink is sunk, as the AI is unaware of what it means to ‘sink a ship’)

AI 2:

* This higher level AI begins by guessing randomly. Once it hits a ship, it will guess around the ship, with an emphasis on linear paths. This prioritizes the linear shape of a ship, rather than just the area surrounding the current hit.

AI 3:

* This AI works similarly to AI 2, however, it has a slight difference in the way it keeps track of its opponent’s board. When a ship is sunk, the AI is alerted that the ‘hit’ on the opponent board is part of a sunken ship, so it should look elsewhere for another ship.

AI 4:

* Building off of AI 3, this AI also keeps track of the sunken ships. So instead of guessing randomly, as a last resort it will guess places that the most of the remaining ships can reside. As an AI, it works better towards the end of a game, as there are less options to choose from. Earlier in the game, it is far more efficient and useful to guess randomly, so that is what the AI does.