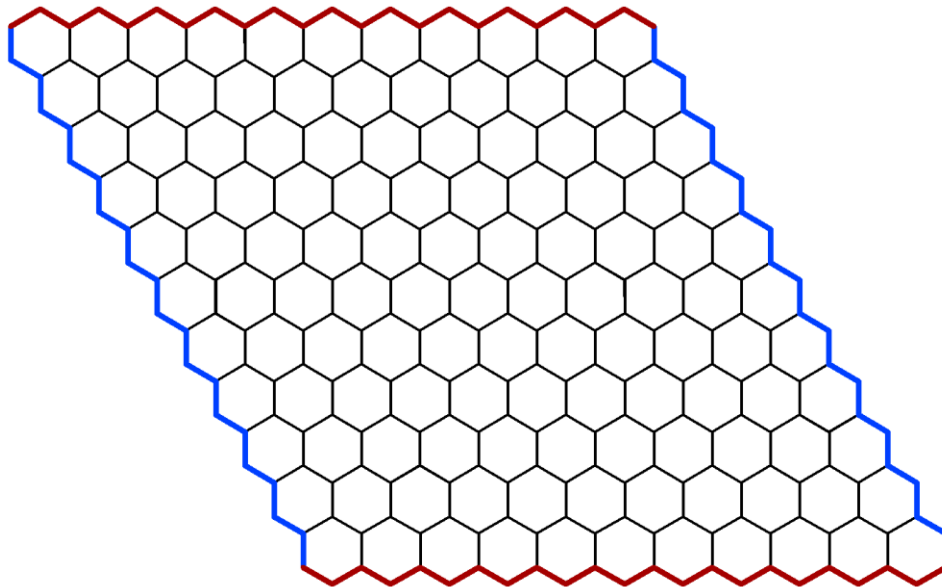# The Game of Hex

If you have not watched A Beautiful Mind, it is recommended that you do. It is not going to help you with this assignment though (Just a recommendation). A Beautiful Mind is a 2001 American biographical drama film based on the life of John Nash. John Nash was an American mathematician who made fundamental contributions to game theory, differential geometry, and the study of partial differential equations. He also happened to invent the game of Hex which is your first assignment.

Here is a link to the deleted scene from the movie where John Nash comes up with a new Game of Go later known as Hex: https://www.youtube.com/watch?v=pTZ3nn2Bge4

Hex is a strategy board game for two players played on a hexagonal grid, theoretically of any size and several possible shapes, but traditionally as an 11×11 rhombus. Players alternate placing markers or stones on unoccupied spaces in an attempt to link their opposite sides of the board in an unbroken chain. One player must win; there are no draws. The game has a deep strategy, sharp tactics and a profound mathematical underpinning related to the Brouwer fixed-point theorem.

A Simple 11x11 Hex Board

The main goal of the game is to connect two opposite sides of the board by creating an unbroken chain of hexes.

To get a better understanding of the game you can play it here against your friends or an AI Player. Here is a link to the game: http://www.lutanho.net/play/hex.html

Now that you are familiar with the game, let's dig into what you are required to do in this assignment.

Step 1: Unzip the Assignment 1 zip file.

Step 2: Run the java files in any compiler you like.

Step 3: Understand the base code.

You have to make a new AI player that would implement the Player interface. Your AI player would make use of the Minimax algorithm and Alpha-Beta Pruning. It is your job to figure out how.

To keep your focus entirely on the two algorithms, here are some tips for you.

1. After you are done making your AI player add a new case for it in the gamerunner class.

```java
private Player createPlayer(int type, int colour, String[] args) {
    Player player = null;
    switch (type) {
        case Player.CLICK_PLAYER:
            player = new PointAndClickPlayer( game: this, colour);
            break;
        default:
            System.out.println("ERROR - no player or exception");
            break;
    }
    return player;
}
```

2. Then add it to the player list in the Player Interface.

```java
public static final String[] playerList = {"Human Player"};
public static final int[] playerIndex = {  CLICK_PLAYER };
```

3. Then run the program and Voila!

Note: After evaluation all your AI Players would compete against each other and the winner would be given a bonus so make sure your player is unbeatable. The selected AI Players for this competition would be notified at the time of evaluation on the basis of time your player takes in making a move and the quality of the move (Hint: Make good use of Alpha-Beta Pruning). Needless to say, plagiarism in this assignment would result in a 0.