**Part A:** **Project Goals and Outcomes:**

Graph theory is a field of mathematics that focuses on the properties and attributes of graphs. A graph is defined as a series of nodes that are connected via edges. Graph theory is full of algorithms and equations for finding paths between two or more nodes, cycles that occur along certain paths, etc. There is a game called “Nowhere to go” where the object is to use blockers to delete edges from a graph and trap your opponent to the point where they have no where they can move their piece.

The goal of this project is to use mathematics to figure out different properties of the game such as: does it matter if you are player 1 or player 2? What happens if you grow or shrink the size of the board? What happens if you change the number of edges that can be deleted at a time? What happens if you add more players?

**Part B: Project Significance:**

* This project will help me develop my knowledge in the field of graph theory and combinatorics.
* This game has yet to be analyzed in any formal setting, so my research may find faults or quirks in the rules of the game.

**Part C: Understanding the Work of Others**

As far as I can tell, this game has yet to be formally analyzed. Research into more of the existing graph theory algorithms will be conducted upon approval of this project.

For a formal definition of the rules of the game see: <http://www.boardgamecapital.com/game_rules/nowhere-to-go.pdf>.

**Part D: Methods and Analysis**

This project will begin by applying basic mathematical equations and algorithms to help form an initial hypothesis. Then, a genetic machine learning algorithm will run simulations of the game in order to create an AI that can play the game with a fairly high success rate. From there, certain aspects of the game will be changed and manipulated to see how it affects the outcome of the games.

**Part E: Timeline:**

* September-October: Initial research will be conducted and a formal literature review will be written. A hypothesis will be formed.
* November-Jan: The machine learning algorithm and graphical interface for playing the game will be designed in Javascript.
* Feb-April: Presentations will be written, posters will be made, and formal conclusions will be written up.