The research for this project primarily extended to different definitions and examples of the concept of zero-sum. The definitions found at the listed sources varied slightly, and all had different characteristics that built up and informed the definition used in the project. From Merriam-Webster, the main takeaway was that wealth in a zero-sum game can only be gained when another player loses it; from the Computer Science page at Stanford, the addition that wealth is neither created nor destroyed, and from Wikipedia, the broad theme that gains and losses are balanced among participants.

What surprised me most during my research was the sheer number of games and interactions which could be considered zero-sum. From the Wikipedia and Stanford pages, virtually any instance of direct competition, including chess, tennis, tic-tac-toe, and the like, are zero-sum games simply because they have one winner and one loser—one cannot win without the other’s loss. Naturally, I wasn’t going to program an entire game of chess for this project, as my love for the game does not extend so far into its inner reaches as to construct a chess AI in a few days, and chess is hardly an under-two-minute game, so I instead used the penny game described in class to demonstrate.

As soon as I started giving significant thought to the structure of the project, I knew I wanted to use payoff matrices to illustrate the point. My theory was that if the system is already effective at representing interactions for game theory, I may as well leverage it, and that it would create a reasonable parallel between concrete and abstract examples. To emphasize this, my iteration of the penny game includes a payoff matrix in the center of the screen, and when a round is calculated, the corresponding cell changes color to represent the exchange of pennies.

On completion of the penny game, the user is presented with a more generic matrix with eight blank text boxes, one for each player’s payoff from each outcome. No further guidance is given than a direction to fill in the blanks with numbers to make a zero-sum game, requiring understanding of the concept to complete the task. If a box is incorrect on checking the answer, it is highlighted in red, and if it is correct, it is instead highlighted in green, providing immediate feedback to ease the process.

Resources:

<https://www.merriam-webster.com/dictionary/zero-sum%20game>

<https://cs.stanford.edu/people/eroberts/courses/soco/projects/1998-99/game-theory/zero.html>

<https://cs.stanford.edu/people/eroberts/courses/soco/projects/1998-99/game-theory/nonzero.html>

<https://en.wikipedia.org/wiki/Zero-sum_game>