Three heuristics are developed and scored against each other to effectively get the Utility value of a node at the end of the depth-limited search. The basic idea behind each of these is to improve the score for available moves for a player and penalize for available moves of opponent:

0. Heuristic 1 : my\_moves - (2 \* opponent\_moves)

0. Heuristic 2 : my\_moves / opponent\_moves

0. Heuristic 3 : my\_moves ^ (1 / opponent\_moves)

The performance of the 3 heuristic functions are compared against each other and it was a pretty close call. I've decided to go with the existing data and selected Heuristic 2 as my choice for the agent.

Here is how they compare:

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Evaluating: Heuristic 3

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Playing Matches:

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Match 1: Student3 vs Random Result: 18 to 2

Match 2: Student3 vs MM\_Null Result: 18 to 2

Match 3: Student3 vs MM\_Open Result: 12 to 8

Match 4: Student3 vs MM\_Improved Result: 13 to 7

Match 5: Student3 vs AB\_Null Result: 13 to 7

Match 6: Student3 vs AB\_Open Result: 13 to 7

Match 7: Student3 vs AB\_Improved Result: 13 to 7

Results:

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Student3 71.43%

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Evaluating: Heuristic 2

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Playing Matches:

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Match 1: Student2 vs Random Result: 18 to 2

Match 2: Student2 vs MM\_Null Result: 14 to 6

Match 3: Student2 vs MM\_Open Result: 14 to 6

Match 4: Student2 vs MM\_Improved Result: 17 to 3

Match 5: Student2 vs AB\_Null Result: 16 to 4

Match 6: Student2 vs AB\_Open Result: 12 to 8

Match 7: Student2 vs AB\_Improved Result: 13 to 7

Results:

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Student2 74.29%

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Evaluating: Heuristic 1

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Playing Matches:

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Match 1: Student1 vs Random Result: 18 to 2

Match 2: Student1 vs MM\_Null Result: 18 to 2

Match 3: Student1 vs MM\_Open Result: 14 to 6

Match 4: Student1 vs MM\_Improved Result: 13 to 7

Match 5: Student1 vs AB\_Null Result: 14 to 6

tournament.py:99: UserWarning: One or more agents lost a match this round due to timeout. The get\_move() function must return before time\_left() reaches 0 ms. You will need to leave some time for the function to return, and may need to increase this margin to avoid timeouts during tournament play.

warnings.warn(TIMEOUT\_WARNING)

Match 6: Student1 vs AB\_Open Result: 12 to 8

Match 7: Student1 vs AB\_Improved Result: 12 to 8

Results:

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Student1 72.14%