Summary

I chose three functions that are inspired from hints given in the course lectures.

AB_Custom: This is a variation of the improved score function where the player is rewarded for not being on the edge of the board and rewarded for the opponent player being on the edge. While not quite a strict definition of centrality to the board, it is based on the fact that you limit the amount of moves you have when you move to the edge and there are greater ways of the opponent boxing you in on subsequent moves.

AB_Custom_2: This is another variation of improved score where the player is penalized for the number of opponent moves left but the penalty is increased as the game board fills up.

AB_Custom_3: This variation rewards the player for being more central to the board. It is similar to Custom Score 0 except that it's a stricter definition of centrality.

tournament.py Results

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***************************
        Playing Matches
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Match #   Opponent     AB_Improved     AB_Custom     AB_Custom_2    AB_Custom_3
                       Won | Lost    Won | Lost    Won | Lost    Won | Lost
   1       Random       8  |   2      8  |   2      6  |   4      7  |   3
   2       MM_Open      3  |   7      1  |   9      3  |   7      1  |   9
   3      MM_Center     6  |   4      3  |   7      6  |   4      6  |   4
   4     MM_Improved    2  |   8      3  |   7      3  |   7      2  |   8
   5       AB_Open      5  |   5      4  |   6      5  |   5      8  |   2
   6      AB_Center     3  |   7      4  |   6      7  |   3      4  |   6
   7     AB_Improved    6  |   4      7  |   3      7  |   3      5  |   5
--------------------------------------------------------------------------
         Win Rate:       47.1%         42.9%         52.9%         47.1%
```

Conclusion

Before running the results, I would have guessed AB_Custom_3 to be the best at winning but it turned out to be AB_Custom_2. The reason for my guess is the discussion around mirroring and centrality that was presented. However, it turned out that it made no different in the win rate. For AB_Custom, it actually reduced the win rate to rely on edge positions. AB_Custom_2 conceptually was trying to achieve the same thing as AB_Custom and AB_Custom_3 in that its best to reduce the number of available opponent's positions but by purely relying on a factor to penalize the player for having more available opponent positions towards the end of the game, it seems to have increased its win rate.