Heuristic Function

custom_score() , in this case the score is calculated based on, it also can be negative, it also penalizes as the opponent has more moves

Score = (number of available moves for the player - number of available moves for the opponent)

custom_score_2() , will return (number of available moves for the player - number of available moves for the opponent)^2 in negative if the player is loosing the game, and positive if the player is winning the game

custom_score_3() *, uses the Utility Score of the Game for the given Player*

$$Score = utility = \begin{cases} +\infty, & \text{"player" wins} \\ -\infty, & \text{"player" loses} \\ 0, & \text{otherwise} \end{cases}$$

After 7 matches with the running of Tournament the gathered data is presented in table below:

Match #	Opponent	AB_Improved		AB_Custom		AB_Custom_2		AB_Custom_3	
		Won	Lost	Won	Lost	Won	Lost	Won	Lost
1	**Random**	10	0	10	0	10	0	9	1
2	**MM_Open**	6	4	7	3	7	3	7	3
3	**MM_Center**	8	2	8	2	8	2	9	1
4	**MM_Improved**	6	4	7	3	5	5	6	4
5	**AB_Open**	6	4	7	3	3	7	5	5
6	**AB_Center**	6	4	7	3	6	4	3	7
7	**AB_Improved**	5	5	6	4	4	6	6	4
	Win Rate:	**67.10%**		**74.30%**		**61.40%**		**64.30%**	

Custom score gave the best result, this heuristic rewards for more available moves for the player and penalizes for opponent's available moves, this can be a negative number, which is not good for player, and if it is positive it is good for the player. Custom_2 dose the same thing, but it penalizes by the possibility of losing and rewards with the positive number for winning possibility, although Custom_2 is computationally more expensive it has worst result than Custom() heuristic.

I recommend Custome_score() for flowing reasons:

1. It is compartmentally less expensive method
2. Delivers better winning results
3. It is a good heuristic function since it is rewarding the available moves for the active player and penalizing for the available moves for the opponent, in other words it is more likely to win the game when the active player has more moves options comparing its opponent