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COMP9101 (T2-2020)
Homework 3 – Q2

As we know the exact number of times the opponent will play Rock, Paper and Scissors as $R_a,\ P_a,\ S_a$, the rounds plan of our play can be arranged as follows.

First, we place as many Papers as possible to counter as many as possible Rocks of the opponent, place as many Scissors as possible to cut as many as possible Papers of the opponent, and place as many Rocks as possible to beat as many as possible Scissors of the opponent. Second, if there are Papers left, place them to tie as many as possible Papers. Similarly, if there are Scissors left, place them to tie as many as possible Scissors. If there are Rocks left, place them to tie as many as possible Rocks. This way we will get the maximum points with $R_b,\ P_b,\ S_b$. The prove is as follows:

Since that we arrange all possible throws which are against the opponent's throws, we do not miss any chance to score a positive point in stage 1. When handling leftover throws in stage 2, if there is not enough space for them to place to tie a round, we will place them to the other space left which will lead to a score loss. As an alternative to deal with this circumstance, we can get out some of the throws already in to strive space for the leftover throws to tie a round. And the throws which we get out will be placed to the other space left, as they are the same as the opponent throws they match, these will also lead a tie. However, although no negative scores happen in this alternative, we lose the same chances to score positive scores. And the amount of the loss and gain is the same, which means this alternative has the same effects as what we do in the initial method. Therefore, there is no better way to score more than the current strategy. Prove completed.