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Question 2

The solution to our problem involves a **greedy algorithm.**

We know that opponent will throw Rock in R_A rounds, Scissors in S_A rounds and Paper in P_A rounds.

We know that:

- ***Paper*** *beats* ***Rock***
- ***Rock*** beats ***Scissors***
- ***Scissors*** beats ***Paper***

Since we can throw our rock R_B times, scissors S_B times and paper P_B times in whichever order we like, knowing ***when***, ***what*** and ***how many*** our opponents will throw, we will attempt to assign the maximum amount of 'wins' we can achieve to our opponents throw.

If we have excess or throws of that 'win', we assign it to the throw which would result in a draw. Alternatively, if we have insufficient throws, we assign the remaining throws which would result in a draw.

Let's take an example to portray this idea

- Our opponents' throws are $R_A = 5$, $S_A = 5$ and $P_A = 5$ (we know when this will be)
- Our throws are $R_B = 3$, $S_B = 7$ and $P_B = 5$

1. For each rock throw of our opponent, R_A = 5, we assign P_B paper throws during those rounds.
We have $P_B = 5$ matching exactly, so we assign it to those rounds and win **5 points**.

2. For each scissor throw of our opponent, $S_A = 5$, we assign R_B rock throws during those rounds.
We have $R_B = 3$ throws, so we assign these, winning **3 points**, and the remaining $S_A - R_B$ throws to what would result in a draw, i.e. 2 of our S_B throws and so **0 points**

(In the above case our only choice of extra throws were the scissor, but if this occurs in the case where we have 2 kinds of throws to choose from, we choose the throws which would result in a draw)

3. And finally, we assign the remaining throws we have to our opponents P_A paper throws, which is the remaining 5 of our S_B throws ($S_B - (S_A - R_B)$), resulting in **5 points.**

And so, by this **greedy method** of playing we will **maximise** the number of points achievable.