Problem 1

The $x$ axis of Figure 2 of Rand & Nowak (2013) is called the "shadow of the future", defined as the quantity

$$w - \frac{T + P - R - S}{T - S}$$

where $w$ is the probability that a given game between two agents in a population of prisoners dilemma players will be a rematch (as opposed to the first match between agents in that population), and $T, P, R, S$ are explained in Box 1 of the paper. Derive this quantity from the information given in the paper.