Exercise 15.5: For every $p$, $P^{(\sigma)}(p) = 0$ if there exists $q \in \sigma(p)$ such that $P(q) = 1$, and $P^{(\sigma)}(p) = 1$ if $P(q) = 0$, for every $q \in \sigma(p)$.

On other hand, for every $p$, we have $P^{(\sigma)}(p) = 0$ if there exists $q \in \sigma(p)$ such that $P(q) = 1$, and $P^{(\sigma)}(p) = 1$ if $P(q) = 0$, for every $q \in \sigma(p)$. Therefore $P^{(\sigma)} = P^{(\sigma)}$.

Similarly we have $P^{(\sigma)} = P^{(\sigma)}$. 
