Challenge 6

A coin is biased so that the probability of obtaining a head is $p$, $0 < p < 1$. Two players, $A$ and $B$, throw the coin in turn until one of the sequences HHH or HTH occurs. If the sequence HHH occurs first, then $A$ wins. If HTH occurs first, then $B$ wins. For what value of $p$ is the game fair (that is, such that $A$ and $B$ have an equal chance of winning)?