# HHT vs. THH

You flip a fair coin successively, stopping only when you observe either the sequence Head-Head-Tail (HHT) or the sequence Tail-Head-Head (THH).   On which sequence is it more likely that you will stop? How much more likely?

Solution to
HHT vs. THH

Consider a Markov diagram of the coin tossing situation as shown below. The four violet-colored ovals represent the possible states defined by the last two coin tosses. The two yellow-shaded shapes represent the two possible end-states. The arrows show all possible transitions from one state to another.
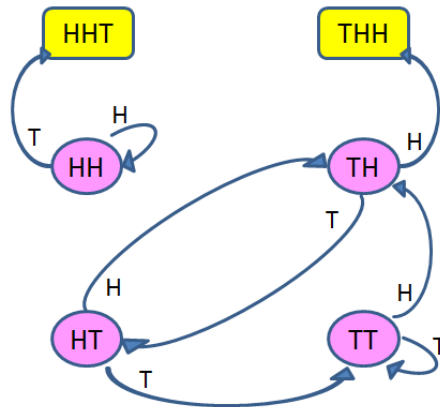
It is clear from the diagram that the only way to reach end-state HHT is to be in state HH. And the only way to reach end-state THH is to be in one of the other three states (TH, HT, or TT). After the first two coin tosses, there is a 25% chance of being in state HH and a 75% chance of being in one of the other three states. So, the probability of reaching end-state HHT is 25% and of reaching end-state THH is 75%.