Names:

CMPSCI 240
Reasoning Under Uncertainty
Discussion 9

Consider the following palindrome: "TOO HOT TO HOOT."

You will be constructing character-based Markov chains for this phrase. You should ignore all punctuation and spaces; the only characters you should care about are "T," "O," and "H."

Question 1: Draw a Markov chain state transition diagram for the palindrome given above with one character per state, labeling each transition with the *frequency* that that transition is observed. (Recall that usually when drawing state transition diagrams, transitions are labeled with transition probabilities; here, however, we are representing the chain in the same way as the homework assignment.) Calculate and list the transition probability from every state to every other state (except START) using smoothing. (You should have 12 probabilities listed when you finish.)

Question 2: Draw a Markov chain state transition diagram for palindrome, now with two tokens per state. Again, label the transitions with frequencies, not transition probabilities.

Calculate the smoothed probabilities for $(O, H) \to (H, H)$, $(O, H) \to (H, O)$, $(O, H) \to (H, T)$.

Because $P(X_{t+1} = (H, H) \mid X_t = (O, H)) > 0$, there's a chance of transitioning to (H, H) which was never observed! For *any* character X, what should $P(X_{t+1} = (H, X) \mid X_t = (H, H))$ be?