CS 332 HW3, Fall 2018

Turn in this sheet with your homework. Write only on one side of each sheet. Do not staple, fold, dog-ear, or otherwise fasten your papers to each other.

The game of bridge is composed of a bidding phase, followed by the playing phase. The game has four players.

In the bidding phase, each player bids in turn. A bid is composed of an integer value from 6 to 13, inclusive, followed by a suit. The suits are clubs (C), diamonds (D), hearts (H), spades (S), or no trump (N). An alternative bid is to pass (P). There is no penalty for passing; a player that passes is not required to pass in their next turn. The bidding continues until there are three passes in a row (PPP), at which point the bidding ends. Each bid, except P, must be larger than the previous bid.

Examples of bidding sequences are 6C6S2NPPP and PP2SP4SPPP. One pathological sequence exists in which all players pass: PPPP.

The details of the playing phase are not relevant to this assignment.

1. (5 pts) Create a grammar in BNF form for bidding sequences. Ignore the requirement that each non-passing bid must be larger than the previous.

2. I(5 pts) What is the weakest machine (FSM, PDA, Turing Machine) required to determine that each bidding sequence ends with PPP? Justify your answer.

3. (5 pts) Is determining if a bidding sequence is legal a syantactic or semantic exercise? Ignore the requirement that each non-passing bid must be larger than the previous. Justify your answer. (For example, 4C2DPPP is not normally legal, but for this question don't consider the magnitude of the bids.)

4. (5 pts) Is verifying that each non-passing bid is larger than the previous bid a syntactic or semantic exercise? Justify your answer.

5. (5 pts) In a simulated bridge game, each of the four players is represented by a software process. These processes share a number of common features, such as a list of cards held in their hands, and cards played so far. They also may have different behaviors in bidding and play to represent various player styles and strategies. What programming paradigm is best suited to represent only this portion of the game, and why?

6. (5 pts) In a simulated game, the cards that have been played must be tracked to make sure that the each card is played exactly once. What programming paradigm is best suited to represent only this aspect of the game and why?