

CSCI 338

Homework 6

Assigned 10/11/2022, due by start of class (3:05 pm) on 10/18/2022. Please submit this assignment to the appropriate dropbox on D2L. You must follow the collaboration policy detailed on the course website.

Problem 1 (5 points). Let $111_{DFA} = \{\langle A \rangle : A \text{ is a DFA and } A \text{ accepts at least one string that has 111 as a substring}\}$. Show that 111_{DFA} is decidable.

Problem 2 (5 points). Let $ALL_{DFA} = \{\langle A \rangle : A \text{ is a DFA and } L(A) = \Sigma^*\}$. Show that ALL_{DFA} is decidable by using the decider for EQ_{DFA} .

Problem 3 (5 points). Let $SUBSET_{DFA} = \{\langle A, B \rangle : A \text{ and } B \text{ are DFAs and } L(A) \subseteq L(B)\}$. Show that $SUBSET_{DFA}$ is decidable.

Problem 4 (5 points). A prunable state in a DFA is some state that is never entered while processing any input string. Show that the following language is decidable:

$$SIMP_{DFA} = \{\langle A \rangle : A \text{ is a DFA with no prunable states}\}$$