Homework #9: MACM-300

Reading: Sipser; Chapter 3; Sections 3.1 and 3.2; Chapter 4; Section 4.1
Distributed on Mar 20; due on Mar 31 (in class)
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Only submit answers for questions marked with †.

(1) † Provide a context-sensitive grammar for $L = \{a^n b^n c^n \mid n \geq 0\}$

(2) Sipser, q3.1

(3) Sipser, q3.2

(4) † Sipser, q3.8.

(5) † Provide a Turing machine that recognizes $L = \{a^n b^n c^n \mid n \geq 1\}$

(6) † Sipser, q3.9

(7) Sipser, q3.11

(8) Sipser, q3.13

(9) Sipser, q3.15

(10) † The set of Turing-decidable languages is closed under complementation. However, the set of Turing-recognizable languages is not. Explain why the proof of closure under complementation for decidable languages from q3.15 does not work for Turing-recognizable languages.

(11) Sipser, q3.22

(12) Sipser, q4.3

(13) † Sipser, q4.4

(14) Sipser, q4.5

(15) † Let $L = \{\langle M \rangle \mid M$ is a DFA that accepts some string of the form ww^R for $w \in \{0,1\}^*$ $\}$. Show that L is decidable.

Hint. Use the fact that context-free languages are closed under intersection with regular languages.