CS 3133 Foundations of Computer Science
C term 2019

(Last) Homework 5, due Monday, February 25

READING: Chapters 7, 8, 14, 15, 16.

1. Exercise 17.b. on page 249. (20 points)

2. Let M be the Turing machine defined by

δ	B	a	b	c
q_0	(q_0, B, R)	(q_0, a, R)	(q_0, b, R)	(q_1, c, L)
q_1	(q_2, B, R)	(q_1, b, L)	(q_1, a, L)	-
q_2	-	-	-	-

   (a) Trace the computation for the input string *abcab*.

   (b) Trace the first six transitions of the computation for the input string *abab*.

   (c) Give the state diagram of M and describe the result of a computation in M.

   (20 points)

3. Construct a Turing machine with input alphabet $\{a, b, c\}$ that accepts strings in which the first c is immediately preceeded by the substring aaa. A string must contain a c to be accepted by the machine. (20 points)

4. Construct a Turing machine with input alphabet $\{a, b, c\}$ that accepts the language $L = \{a^i b^i c^i \mid i \geq 0\}$ by halting only. (20 points)

5. Construct a standard Turing machine that accepts the set of palindromes over $\{a, b\}$. (20 points)