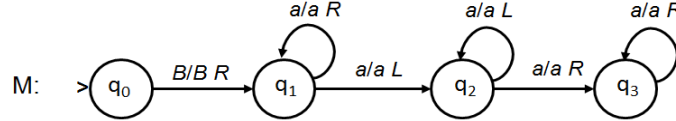


Team Assignment 10: Chapter 15. P , NP , and Cook's Theorem

Due Tuesday, April 12

Names: _____ Section: _____ Score: ____/50 pts

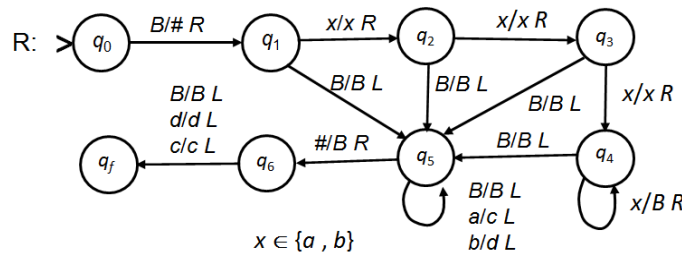
1. (Problem 15.1 on Page 493) Let M be the Turing machine



- (b) [10 pts] Describe the computation of M with input a^n that requires the *maximum* number of transitions.

- (c) [3 pts] Give the function tc_M .

2. The (following) machine R computes a function from $\{a, b\}^*$ to $\{c, d\}^*$ (Problem 15.12 on Page 495):



- (b) [10 pts] What string of length n will cause R to use the greatest number of transitions? Explain Why.

- (c) [3 pts] Give the function tc_R .

- (d) [8 pts] Does the machine R reduce the language $L = abb(a \cup b)^*$ to the language $Q = (c \cup d)^*cdd^*$? If yes, prove that the function computed by R is a *reduction*. If no, give a string that demonstrates that the mapping is not a reduction.

3. [16 pts] Assume that $P = NP$. Let L be the language in NP with $L \neq \emptyset$ and $\bar{L} \neq \emptyset$. Prove that L is NP -complete (Problem 15.17(a) on Page 495).