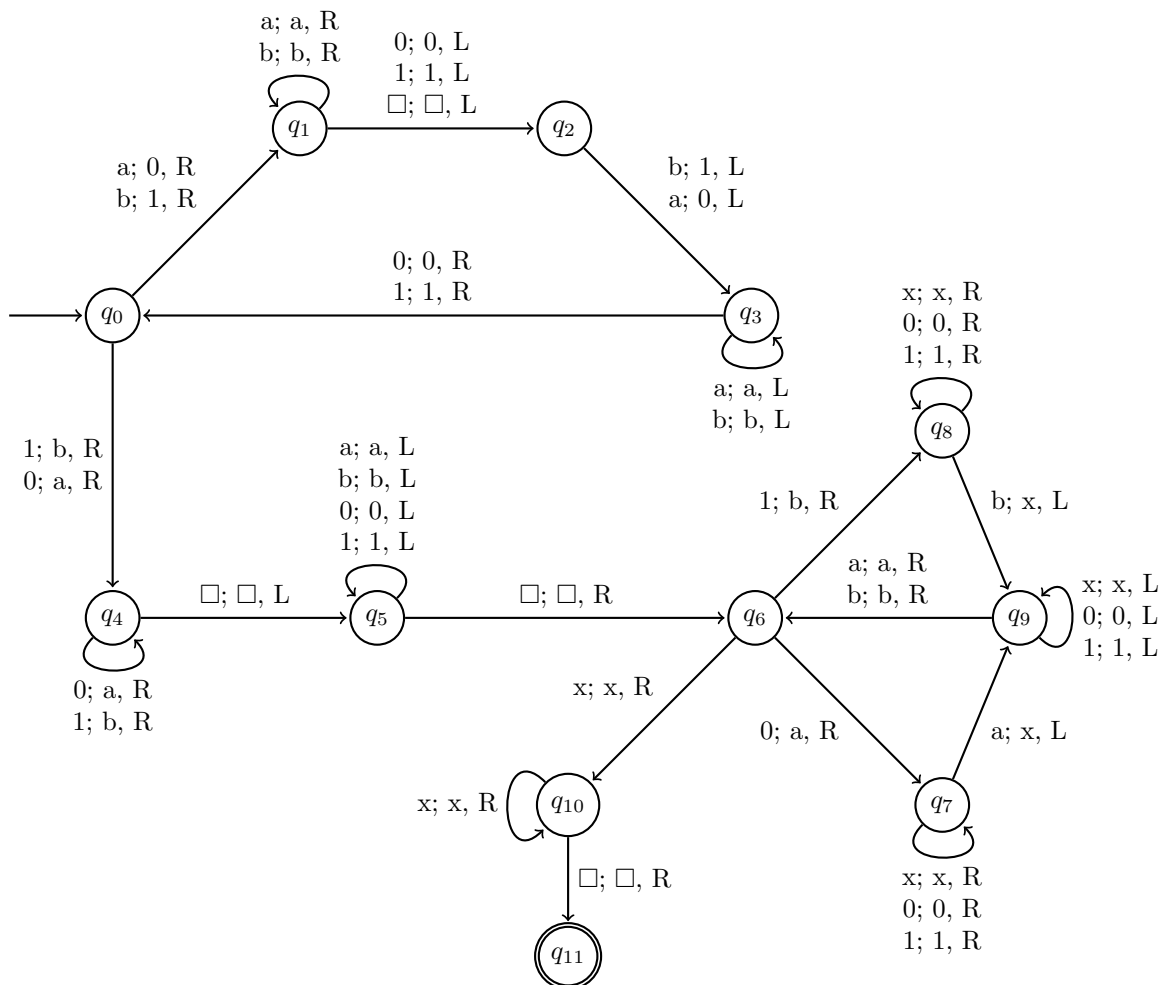


Name _____

CSci 311: Models of Computation
CSci 500: Fundamental Concepts of Computing
Fall 2024 Homework #3
Due Date: November 23, 2024 by 2:30 pm

Directions: For each problem where you are creating a Turing Machine (TM), don't forget to write it as a septuple as well. You should create a document with septuple with transition functions and create jff files for actual TMs. You should submit a zip file with all jff files and the document to Blackboard. For each language assume that only the symbols mentioned are in the input alphabet.

- Using the TM below, write out the instantaneous descriptions for the following string. For each string, determine if the string is accepted or rejected by the TM after you list the complete set of instantaneous descriptions. Use the symbol \vdash to represent a move from one instantaneous description the next. To get the symbol \vdash you can do the following: on a Mac, type Command+Control+SpaceBar and click 'Math Symbols' in the left bar and on row 26, you should see the symbol. On a Windows machine, you should be able to hold down the ALT key and type '195' **with the keypad** and the symbol should show. Suggestion: Copy it once you have it and paste it when needed. (5 points each). **I apologize early for the length of some of these.**



- (a) abbabb (b) babab (c) ababa (d) aabb (e) aa

2. Using JFlap, draw a TM that accepts strings in each of the languages below. Include the septuple of the language with transition functions in the document. Assume $\Sigma = \{a, b\}$ unless otherwise stated. (15 points each).

- (a) $L_1 = \{a^n b^n a^n b^n : n \geq 1\}$
(b) $L_2 = \{a^n b^m a^{n+m} : n \geq 0, m \geq 1\}$
(c) $L_3 = \{a^n b^m b^n a^m : m \geq 1, n > m\}$
(d) $L_4 = \{w : w \in \{a, b\}^+, |w| \bmod 4 = 0\}$
(e) $L_5 = \{wcw : w \in \{a, b\}^*, \Sigma = \{a, b, c\}\}$