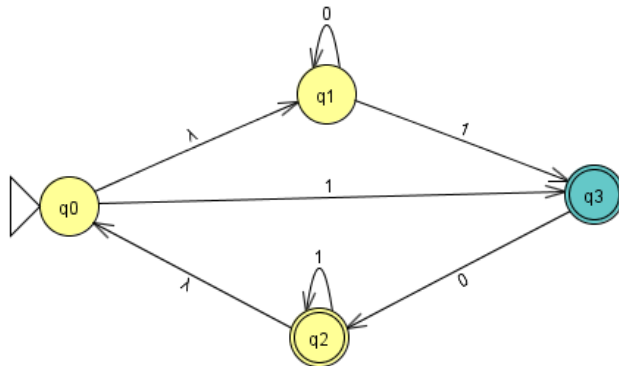


CS 321 HW2

Submit a pdf in Canvas. Use a word processor and/or JFLAP. (30 pts)

1) (4 pts) Convert the following NFA into an equivalent DFA



2) (3 pts) Show that the language $L = \{vww : v, w \in \{a,b\}^*, |v| = 2\}$ is a regular language.

3) (4 pts) Prove that if L is regular language then L^R is a regular language.

4) (9 pts) Give regular expressions for the following languages on $\Sigma = \{a, b\}$

- a) $L_1 = \{w : n_a(w) \bmod 3 = 1\}$.
- b) $L_2 = \{w : w \text{ ends in } aa\}$.
- c) $L_3 = \text{all strings containing no more than three } a's.$

5) (4 pts) Consider a type of scientific notation for real numbers with the following rules:

- a. A number can be preceded by a "+" or "-" sign or the sign may be absent.
- b. Numeric values must be of the form $cb_1b_2\dots b_n$ where b_i is any digit, but c must be nonzero.
- c. The number may be followed by an exponent field of the form $e^+y_1y_2$ or $e^-y_1y_2$, where y_i can be any digit $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$.

For example the strings -123e+10 and 257 represent real number in this scientific format. Give a regular expression for this scientific notation. Let $\Sigma = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, "+", "-", e\}$. (Note: With this convention "+" is the sign associated with the scientific number and + the operator of the regular expression.)

6) (6 pts) Find a regular grammars for the following languages on $\Sigma=\{a, b\}$:

- a) L_0 is all strings with exactly one a
- b) $L_1 = \{w : n_a(w) \bmod 3 = 1\}$.