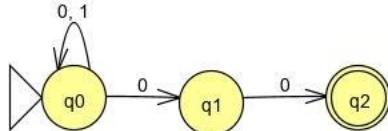


CSE 355: Intro to Theoretical Computer Science Recitation #3 Solution (20 pts)

- Due: at 11:59pm Arizona time on Canvas.

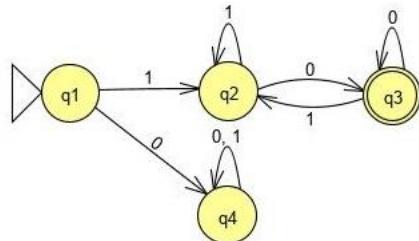
1. [5 pts] Use [JFLAP](http://www.jflap.org) (<http://www.jflap.org>) to draw the state diagram of NFA with **three** states that recognize the following language, assume alphabet $\Sigma = \{0, 1\}$. (Save the diagram as .jpg file and paste it here)

$$L = \{\omega \mid \omega \text{ ends in } 00\}$$

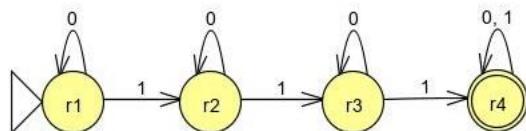


2. [5 pts] Use the construction in the proof of Theorem 1.45 (textbook pp.80) to give the state diagram of NFA that recognize the **union** of the following two languages ($L_1 \cup L_2$). First construct NFAs state diagram using [JFLAP](http://www.jflap.org) (<http://www.jflap.org>) for each individual language, then combine them. Assume alphabet $\Sigma = \{0, 1\}$.

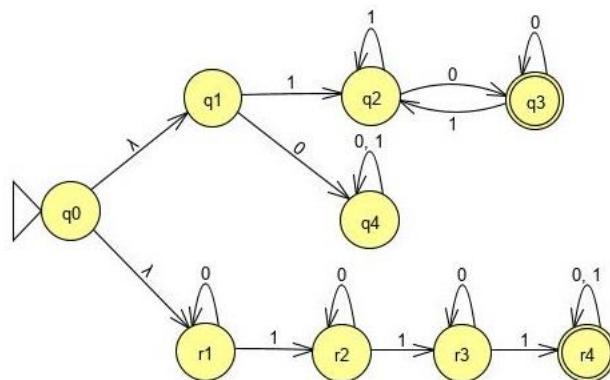
$$L_1 = \{\omega \mid \omega \text{ begins with a } 1 \text{ and ends with a } 0\}$$



$$L_2 = \{\omega \mid \omega \text{ contains at least three } 1s\}$$

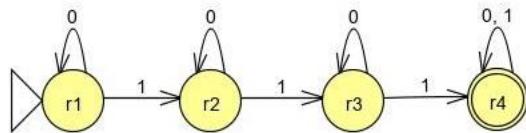


$$(L_1 \cup L_2) = \{\omega \mid \omega \text{ begins with a } 1 \text{ and ends with a } 0, \text{ OR } \omega \text{ contains at least three } 1s\}$$

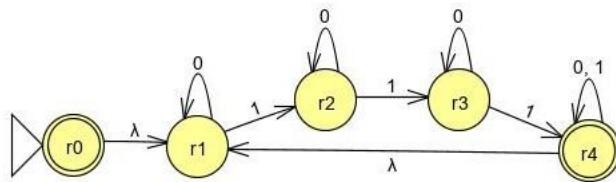


3. [5 pts] Use the construction in the proof of Theorem 1.49 (textbook pp.83) to give the state diagram of NFA that recognize the *star* of the following language (L_1^*). Assume alphabet $\Sigma = \{0, 1\}$.

$L_1 = \{\omega \mid \omega \text{ contains at least three } 1\text{s}\}$

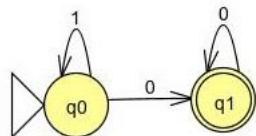


(L_1^*)

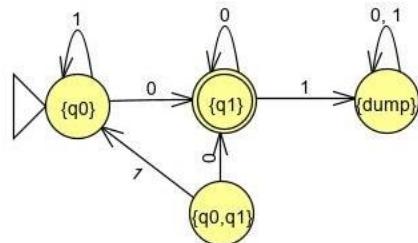


4. [5 pts] Let alphabet $\Sigma = \{0, 1\}$ and $L = \{\omega \mid \omega = 1^m 0^n \text{ such that } m \geq 0, n \geq 1\}$

A) [2pts] Draw the state diagram of an NFA with no more than two states that recognize L



B) [3 pts] Use the powerset construction method discussed in class to convert above NFA into a DFA (no need to simplify your DFA), draw its state diagram.



(Note: this DFA could be simplified by removing state $\{q0, q1\}$, but the problem asked you to show the original DFA before simplification)