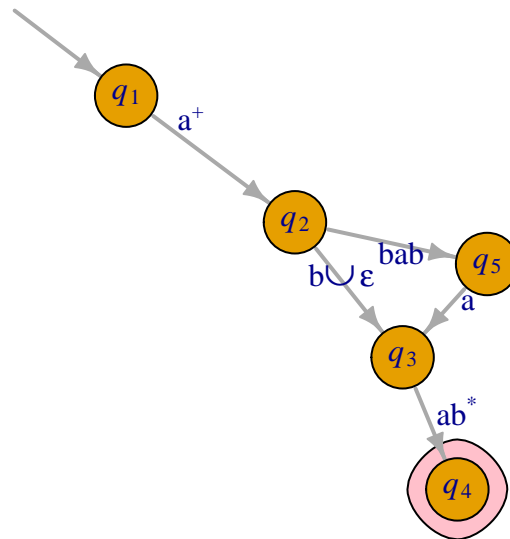


Pework 1.3a: Regular Expressions

Write your preliminary solutions to each problem and submit a PDF on Canvas. The names in brackets indicate the subset responsible for presenting the problem.

1. [Ben, Grace] Give a regular expression that describes the language consisting of all strings in $\Sigma = \{a, b\}$ that have an even number of a's and an odd number of b's but do not contain the substring ab.
2. [Joshua, Allie] Consider the language described by the regular expression $a(abb)^* \cup b$. Use the construction of the proof of Lemma 1.55 to build an NFA that recognizes this language.
3. [Micah, Todd, Curtis] Consider the language described by the regular expression $(0 \cup 1)^* 000(0 \cup 1)^*$. Use the construction of the proof of Lemma 1.55 to build an NFA that recognizes this language.
4. [Andrew, Meghan, David] A *generalized nondeterministic finite automaton* (GNFA) is a version of an NFA where the edges can be labeled with regular expressions, not just symbols. A GNFA accepts a string if the parts of the string match the regular expressions as you move along the arrows. Consider the GNFA below, and the strings aa, aababaabbb, aaabab. Which of these strings does it accept?



5. [Ky, Connor, Levi] Modify the GNFA in Problem 4 to create a new GNFA with only four states that recognizes the same language. Do this by deleting state q_5 and modifying the label on the arrow from states q_2 to q_3 .

BEGIN YOUR SOLUTIONS BELOW THIS LINE