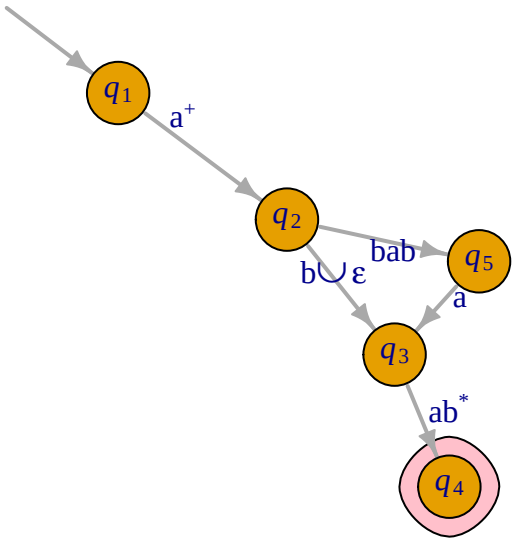
Prework 1.3a: Regular Expressions

Write your preliminary solutions to each problem on this sheet of paper (front and back). 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