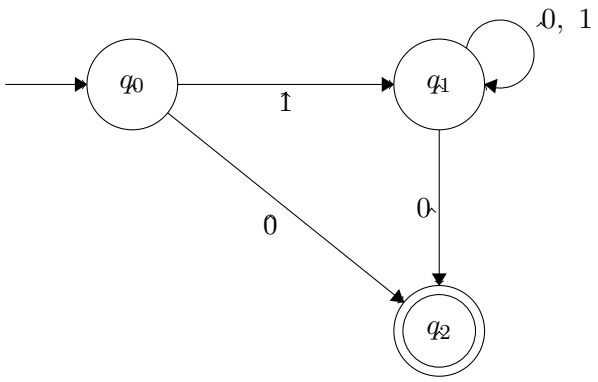
Homework 2

February 8, 2024

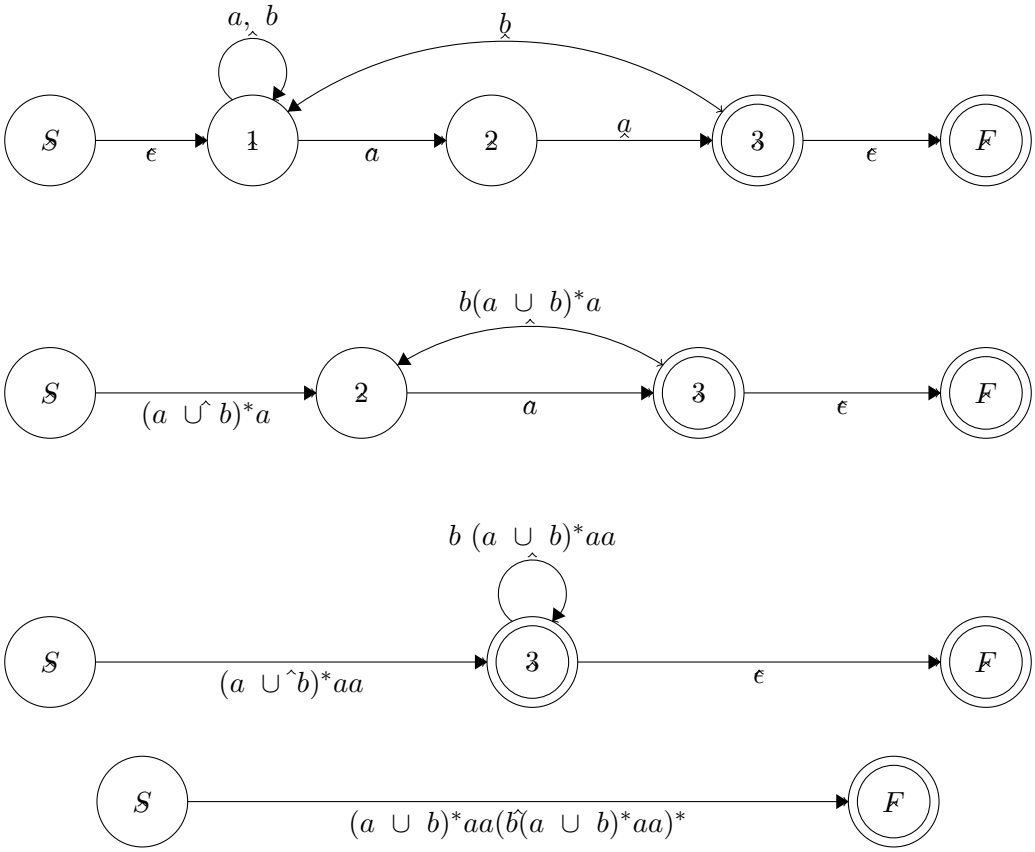
1: Regular Construction

(a) $((a \cup b)^* bc(a \cup b)^* bc(a \cup b)^* bc)^*(a \cup b)^*$

(b)



2: NFA to RegEx Conversion



RegEx = $(a \cup b)^*aa(b(a \cup b)^*aa)^*$

3: More than Regular

Suppose, for the sake of contradiction, that A is regular. Then by definition, there is a DFA M for which there is a pumping lumma, p. Let $s = 0^p 1^{(p+1)}$. By the pumping lumma, we can divide s into x, y, z where $|xy| \leq p$ and $|y| \geq 1$. Then $y = 0^k$ represent the number of 0's for $0 < k \leq p$. Pumping up gives us $xy^2z = 0^{(p+k)}1^{(p+1)}$. Since $k \geq 1$, then $p + k \geq p + 1$. Therefore, the number of 0's will be greater than or equal to the number of 1's Thus, there is a contradiction because $xy^2z \notin A$. Thus, A cannot be regular.