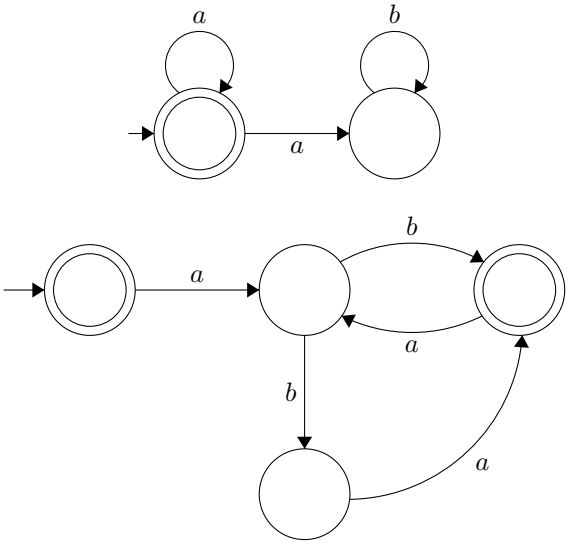
COMP3721 Tutorial 4

1 NFA → Regular Expression

1. Write regular expressions for the languages accepted by the following NFA.



2 Application of Finite Automuta

1. Prove that if L is regular, then the following languages are also regular.
   (a) $Subseq(L) = \{w_1 \dots w_k : x = x_0 w_1 \dots w_k x_k \in L \text{ for some } x_0, \dots, x_k\}$.
   (b) $L^R = \{w : w^R \in L\}$.

3 Pumping Theorems

1. Are the following languages on $\{a, b\}$ regular or not? Prove your answer.
   (a) $\{a^i b^j : i > j \geq 1\}$.
   (b) $\{ww : w \in \{a, b\}^*\}$.
   (c) $\{(bab)^i (babbab)^i : i \geq 1\}$.

4 More Problems

1. Are the following statements true or false?
   (a) Every subset of a regular language is regular.
   (b) If L is regular, then so is $\{xy : x \in L \text{ and } y \notin L\}$.
   (c) $\{w : w = w^R\}$ is regular.
   (d) If L is a regular language, then so is $\{w : w \in L \text{ and } w^R \in L\}$.