INT201 Decision, Computation and Language

Tutorial 4

Dr Yushi Li

Xi'an Jiaotong-Liverpool University
西交利物浦大學

1. Let $\Sigma = \{a, b\}$. Define $A = \{\, w \in \Sigma^* \mid |w| \geq 3,$ second-to-last symbol of w is $b \,\}$.

   Is A closed under **reversal**? If YES, give a proof. If NO, give a counterexample.

   Draw a DFA for A. You only need to draw the picture. You do not need to give the formal definition of your DFA as a 5-tuple.

2. Give regular expressions that generate each of the following languages. In all cases, the alphabet is $\Sigma = \{a, b\}$.

   The language $\{\, w \in \Sigma^* \mid |w|$ is odd $\}$.

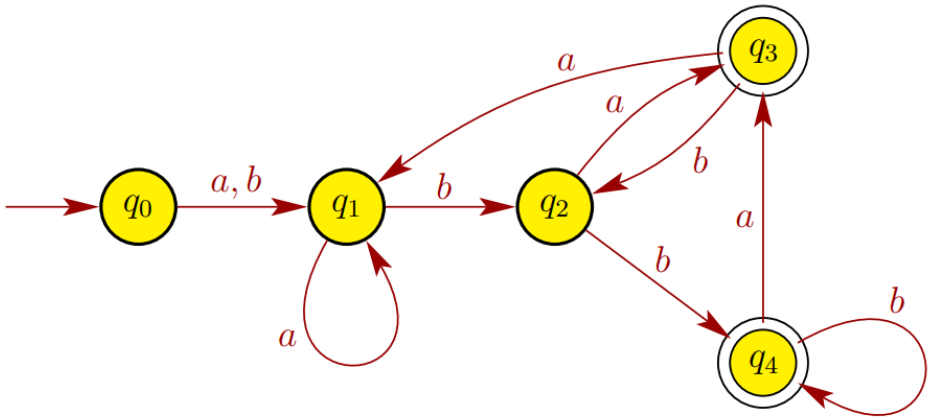
   The language $\{\, w \mid w$ contains at least two a's, or exactly two b's $\}$.

Solutions

1.

A is not closed under reversal. For example, $aaba \in A$, but $(aaba)^{\mathcal{R}} = abaa \notin A$ since its second-to-last symbol is a.

A DFA for A is below:



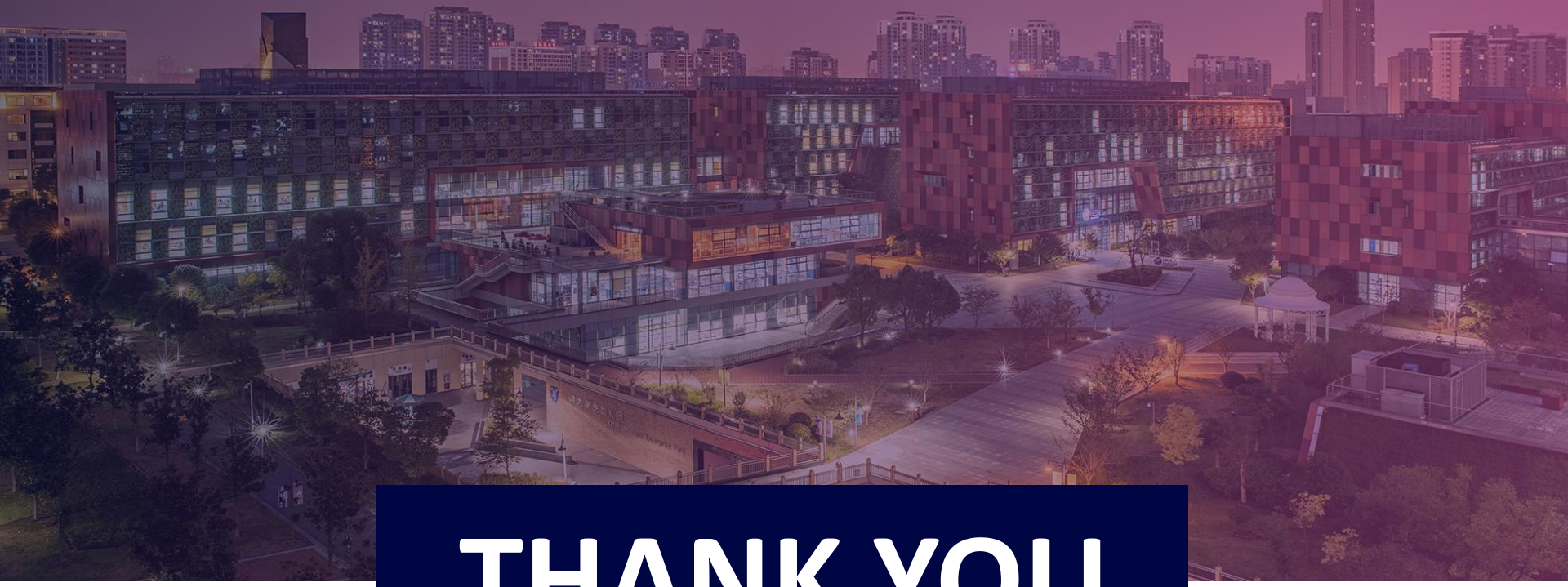
2.

The language $\{ w \in \Sigma^* \mid |w| \text{ is odd} \}$.

Answer: $(a \cup b)((a \cup b)(a \cup b))^*$

The language $\{ w \mid w \text{ contains at least two } a\text{'s, or exactly two } b\text{'s} \}$.

Answer: $b^*ab^*a(a \cup b)^* \ \cup \ a^*ba^*ba^*$



THANK YOU

Xi'an Jiaotong-Liverpool University
西交利物浦大学

XJTLU | SCHOOL OF FILM AND TV ARTS