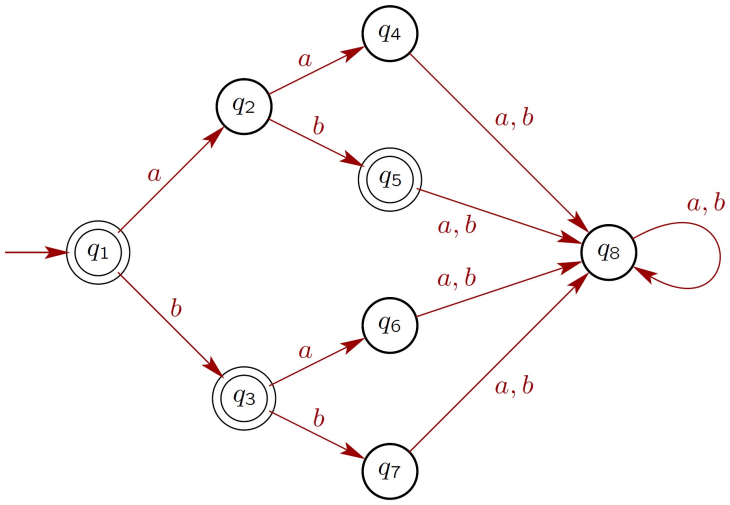
INT201, Assignment 1

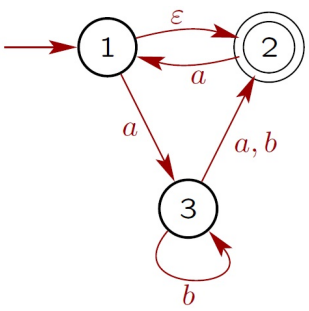
Question 1

Given an DFA that recognizes the language $A = \{\epsilon, b, ab\}$ as follows, please present its symbolic description. (20 marks)



Question 2

Use the construction given in our lecture to convert the following NFA N into an equivalent DFA. Notably, you only need to draw the corresponding transition graph. (20 marks)



Question 3

Design an NFA with exactly four states for the language $\{w \in \Sigma^* \mid w$ contains the substring $aab\}$, where $\Sigma = \{a, b\}$. You only need to draw the graph. (20 marks)

Question 4

For each of the languages that all strings begin with b and end with a, over the alphabet $\Sigma = \{a, b\}$, give a DFA and a regular expression for it. For the DFA, you only need to draw the graph. (20 marks)

(a) Draw the DFA graph. (12 marks)

(b) Give its regular expression. (8 marks)

Question 5

Consider the language $A = \{www | w \in \{a, b\}^*\}$, proving that it is not a regular language through pumping lemma. (20 marks)

(a) Describe pumping lemma for regular languages. (4 marks)

(b) Prove that A is not a regular language. (16 marks)