

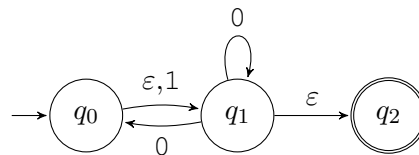
Week 2 Tutorial Session

Tutorial exercises include more problems than what a typical student can solve in 15–20 minutes. Don't be discouraged if you cannot solve all the problems within the time limit.

1. Draw a state diagram of a DFA (over $\{a, b\}$) that accepts the following language:

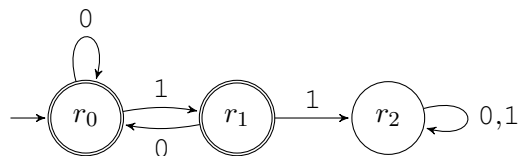
- (a) $\{w \mid w \text{ contains the substring } baa\}$
- (b) $\{w \mid w \text{ has at least two } a\text{'s or at least two } b\text{'s}\}$
- (c) $\{w \mid w \text{ contains the same number of occurrences of } ab \text{ and } ba \text{ as substrings}\}$
 For example aba is in this language because aba contains a single ab and a single ba , but $abab$ is not in this language because $abab$ contains two ab and one ba .

2. (a) We considered the following NFA in the second lecture:



Does the NFA accept 01 ? 11 ? 011 ?

(b) Consider the following DFA:



What strings stop at r_0 ? At r_1 ? At r_2 ? What is the language of the DFA?

3. (Work on this problem only if you have solved others and still have time left) Prove that every NFA can be converted into an equivalent one that has a single accepting state.