

Regular Operations (completed)

Sipser 1.2 (pages 47-63)

Regular languages are closed under:

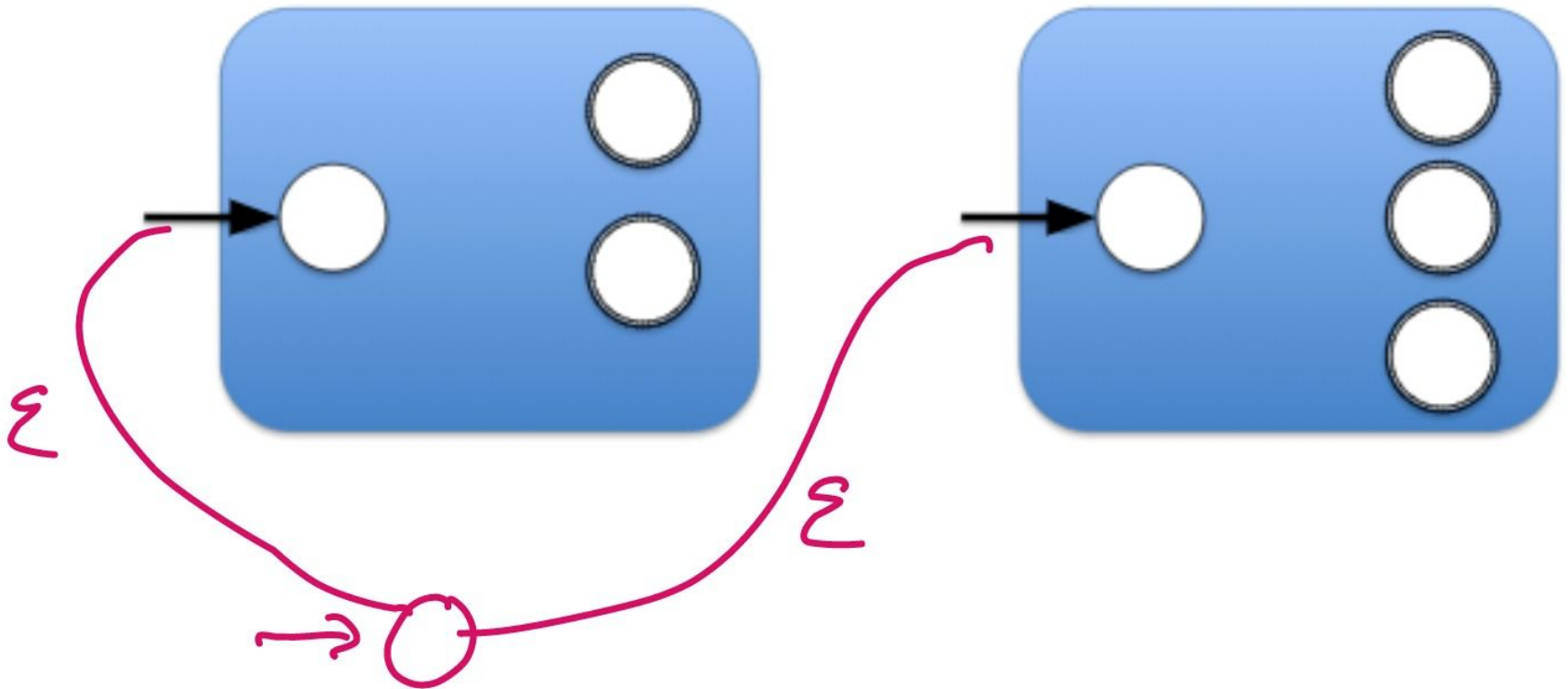
- complement
- **union**
- intersection
- **concatenation**
- **star**

a sample proof

LaTeX files on the web site

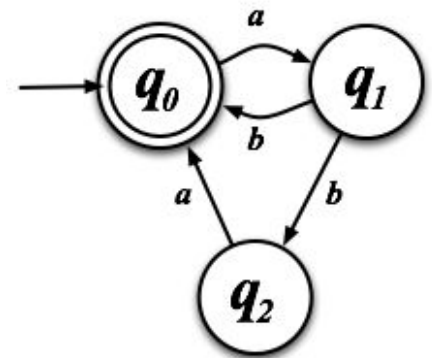
Your turn...

closure under union!



NFA

- A **nondeterministic finite automaton (NFA)** is a 5-tuple $(Q, \Sigma, \delta, q_0, F)$, where
 - Q is a finite set called the **states**
 - Σ is a finite set called the **alphabet**
 - $\delta: Q \times \Sigma^* \rightarrow P(Q)$ is the **transition function**
 - $q_0 \in Q$ is the **start state**
 - $F \subseteq Q$ is a set of **accept states**
- In-class exercise:



NFA computation

- Let $N=(Q, \Sigma, \delta, q_0, F)$ be a NFA and let w be a string over the alphabet Σ
- Then N **accepts** w if
 - w can be written as $w_1w_2w_3...w_m$ with each $w_i \in \Sigma$ and
 - There exists a sequence of states $s_0, s_1, s_2, \dots, s_m$ exists in Q with the following conditions:

1. $s_0 = q_0$
2. $s_{i+1} \in \delta(s_i, w_{i+1})$ for $i = 0, \dots, m-1$
3. $s_m \in F$

