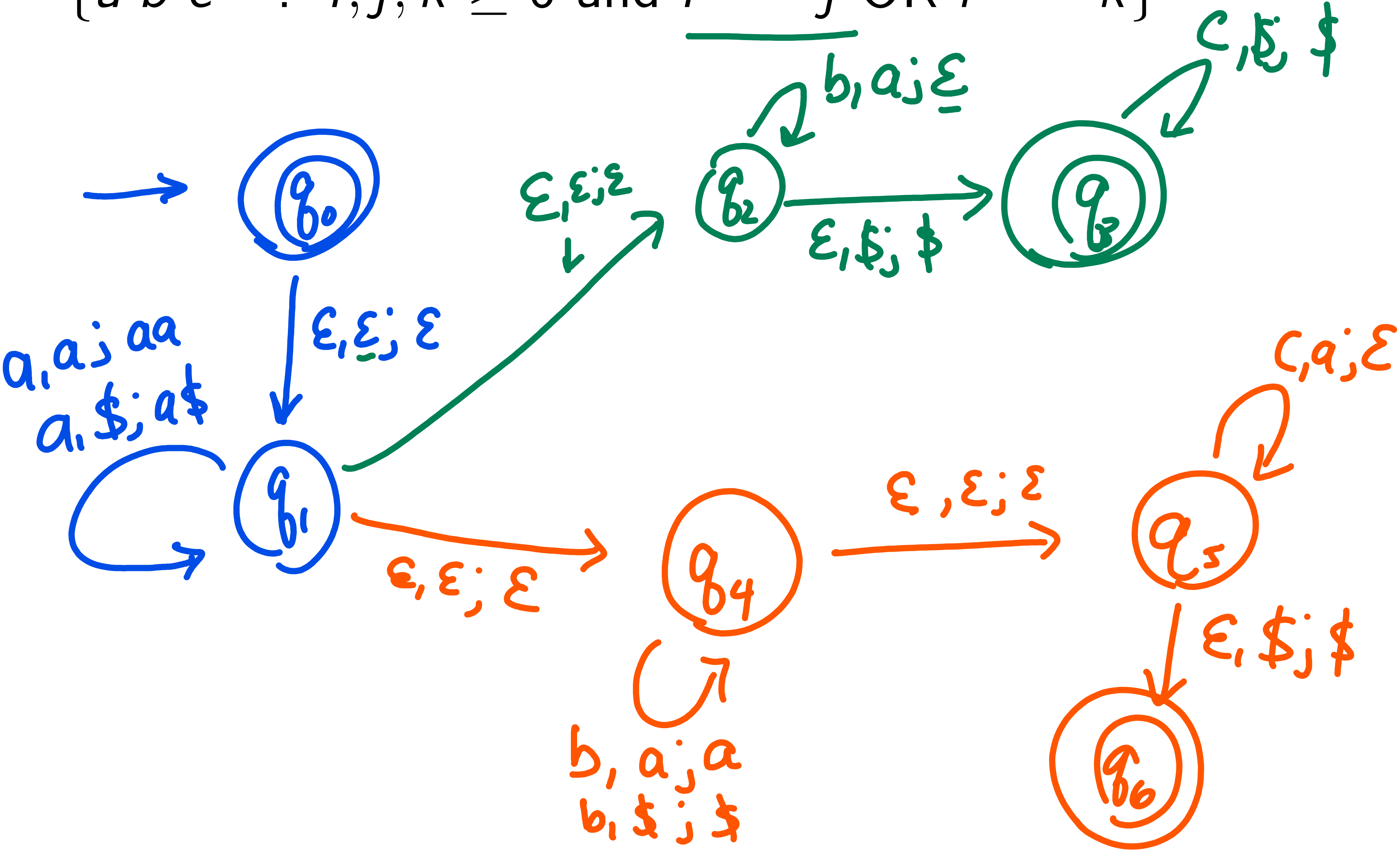
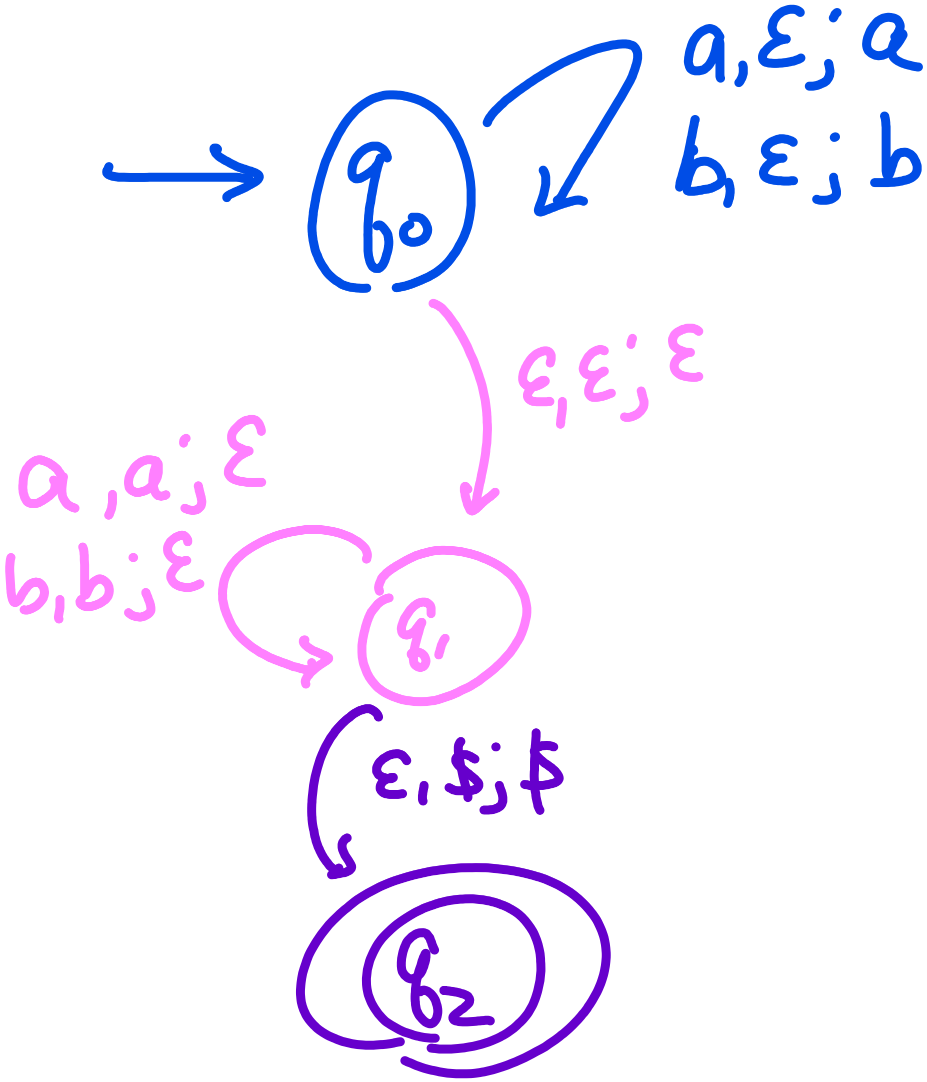
From Lecture 9

$$\{a^i b^j c^k \ : \ i,j,k \geq 0 \text{ and } i == j \text{ OR } i == k\}$$



Also from lecture 9

$$\{ww^R \ : \ w \in \{a, b\}^*\}$$



TODO: read w^R

CompSci 162
Spring 2023 Lecture 10:
Equivalence of CFGs and PDAs

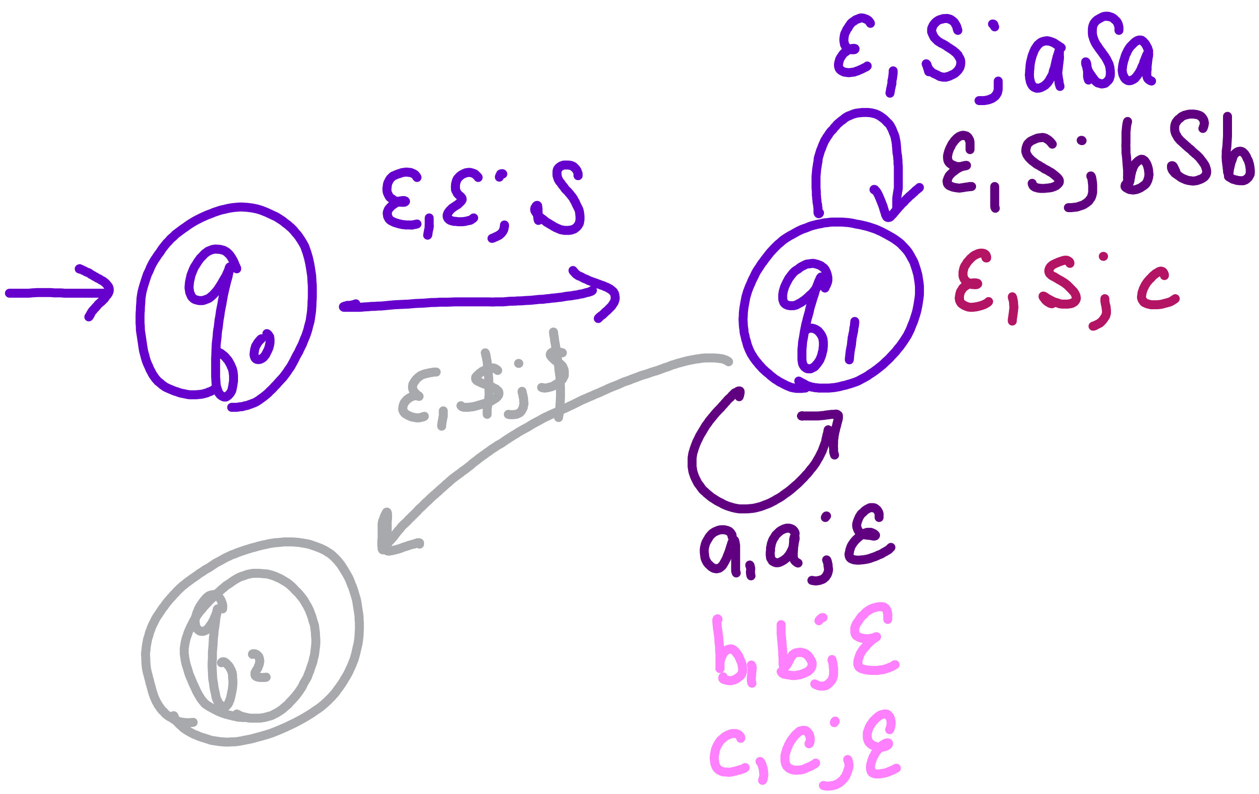
What is this lecture?

- Unit 1: RegEx / DFA / NFA equivalences
- Today, CFGs and PDAs:
  A proof in two parts
  - Every CFL is accepted by some PDA
  - Every language accepted by a PDA is CF

Every CFL is accepted by some PDA

~~abbcbba~~

- But first an example
- Recall the grammar:
  $S \to aSa \mid bSb \mid c$ for $\{wcw^R \ : \ w \in \{a, b\}^*\}$
- Define a PDA *based on this grammar.*



Stack:

S

$\cancel{a}Sa$

$\cancel{b}Sba$

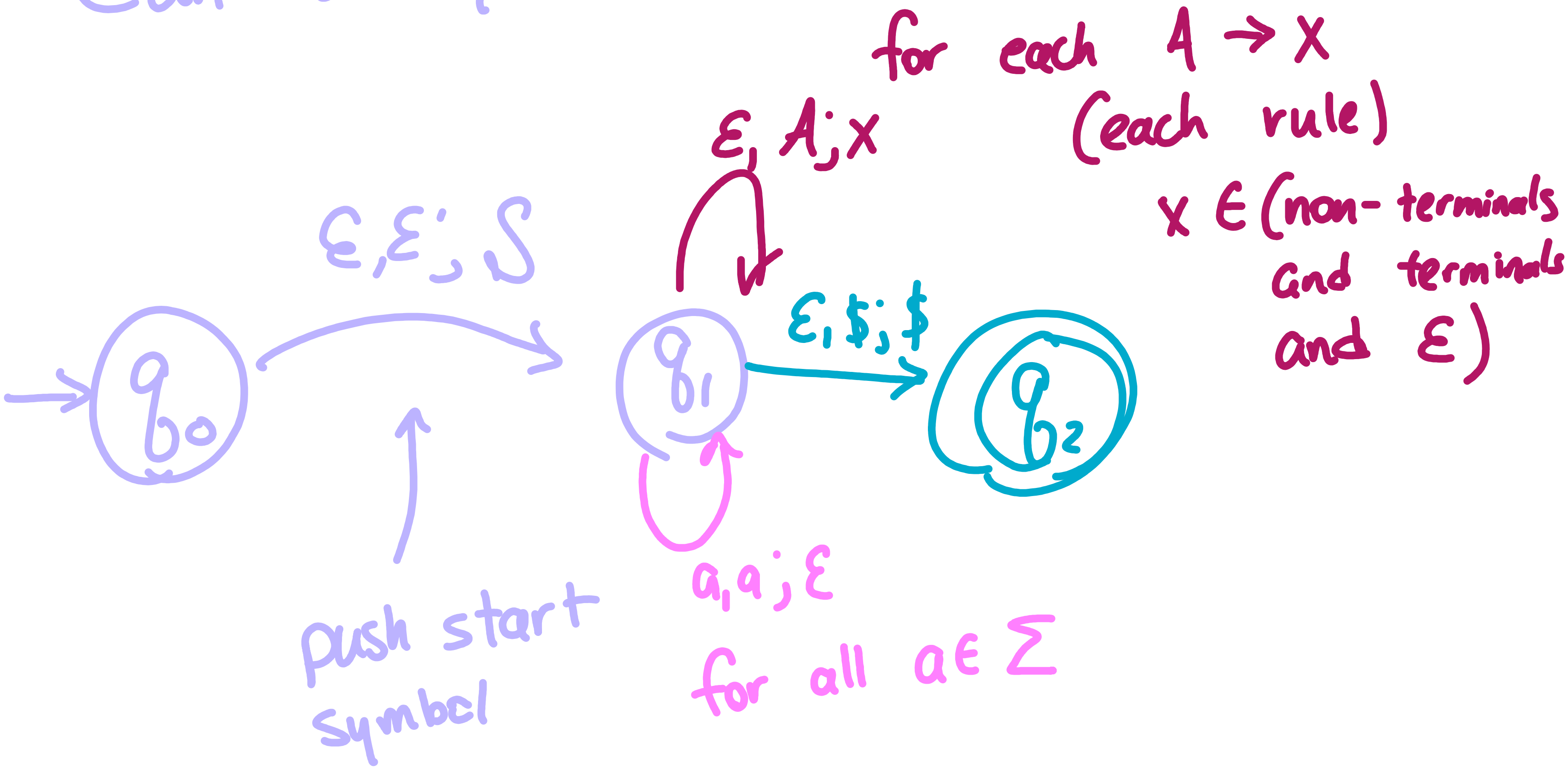
$\cancel{b}Sbba$

~~cbba~~

General Method

Given $G = (V, \Sigma, R, S)$, create PDA:

Can always do with 3 states



Every language accepted by PDA is CF

For all pairs of states p, q, create A_{pq}

generates all strings that take you $p \rightsquigarrow q$

Simplifying Assumptions:

1. Only one accept state
2. PDA empties stack before accepting
3. Each transition: exactly one push XOR one pop