

Matthew ACS

COT 4420 – Formal Language and Automata Theory
Spring 2021

Instructor: Dr. Dimitris Pados

Teaching Assistant: Mr. Andrew Steinberg

Homework 2

Problem 1

Consider the alphabet $\Sigma = \{a, b, c\}$. Derive formally a grammar G that produces the language $L(G) = \{(abc)^n c^n : n \geq 0\}$.

$$G = (\{S, B\}, \{a, b, c\}, S, P)$$

P :

$$S \rightarrow abc S$$

$$S \rightarrow B$$

$$B \rightarrow c B$$

$$B \rightarrow \lambda$$

Problem 2

What language is generated by the grammar $G = (\{S, A, B\}, \{a, b\}, S, P)$ where the productions P are

$$S \rightarrow AB$$

$$A \rightarrow a$$

$$B \rightarrow BB \mid b \mid \lambda$$

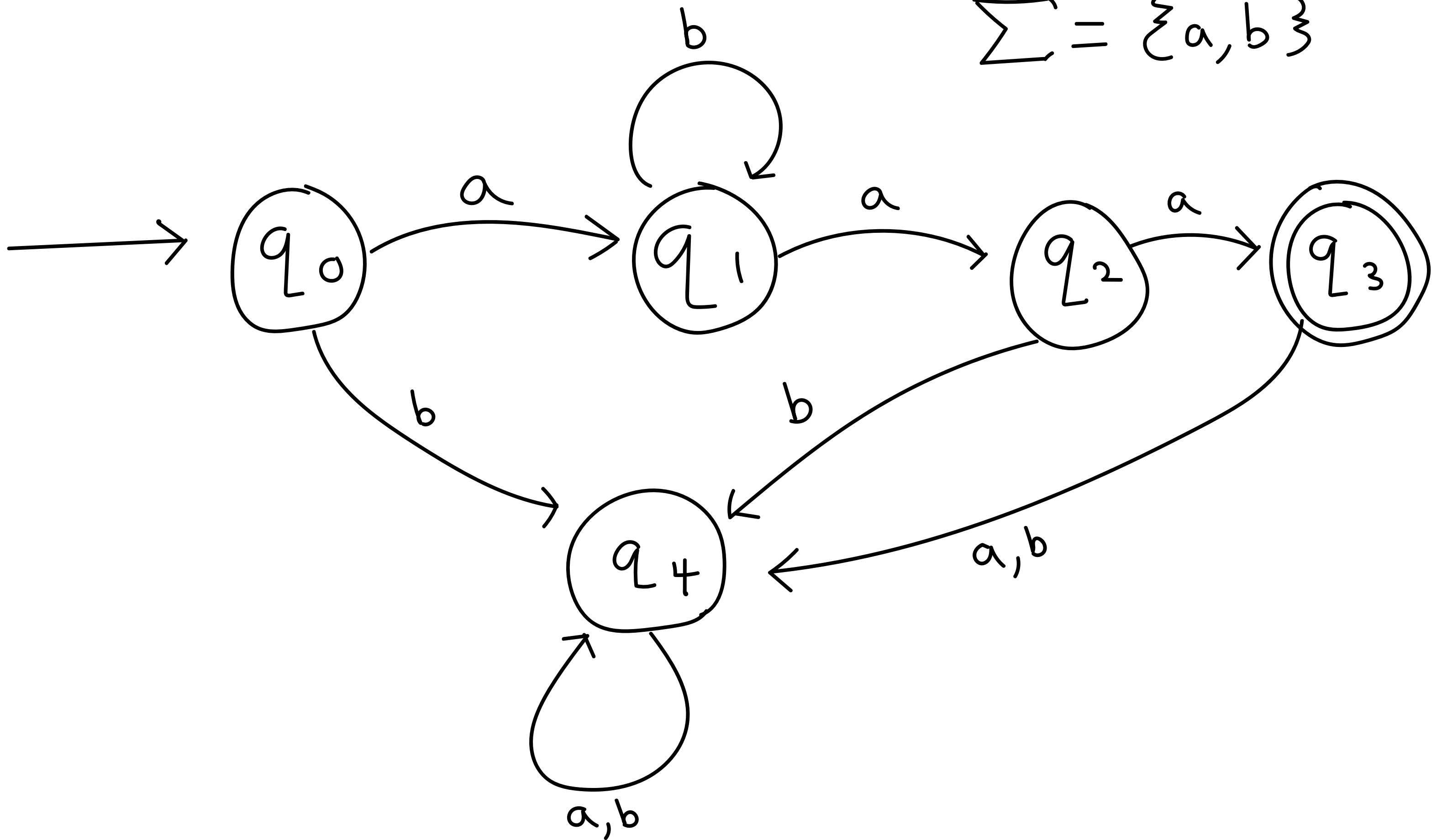
?

$$L(G) = \{a(b)^n : n \geq 0\}$$

Problem 3

Design a deterministic finite acceptor (DFA) automaton that accepts the language
 $L = \{ab^n a^2 : n \geq 0\}$.

$$\Sigma = \{a, b\}$$

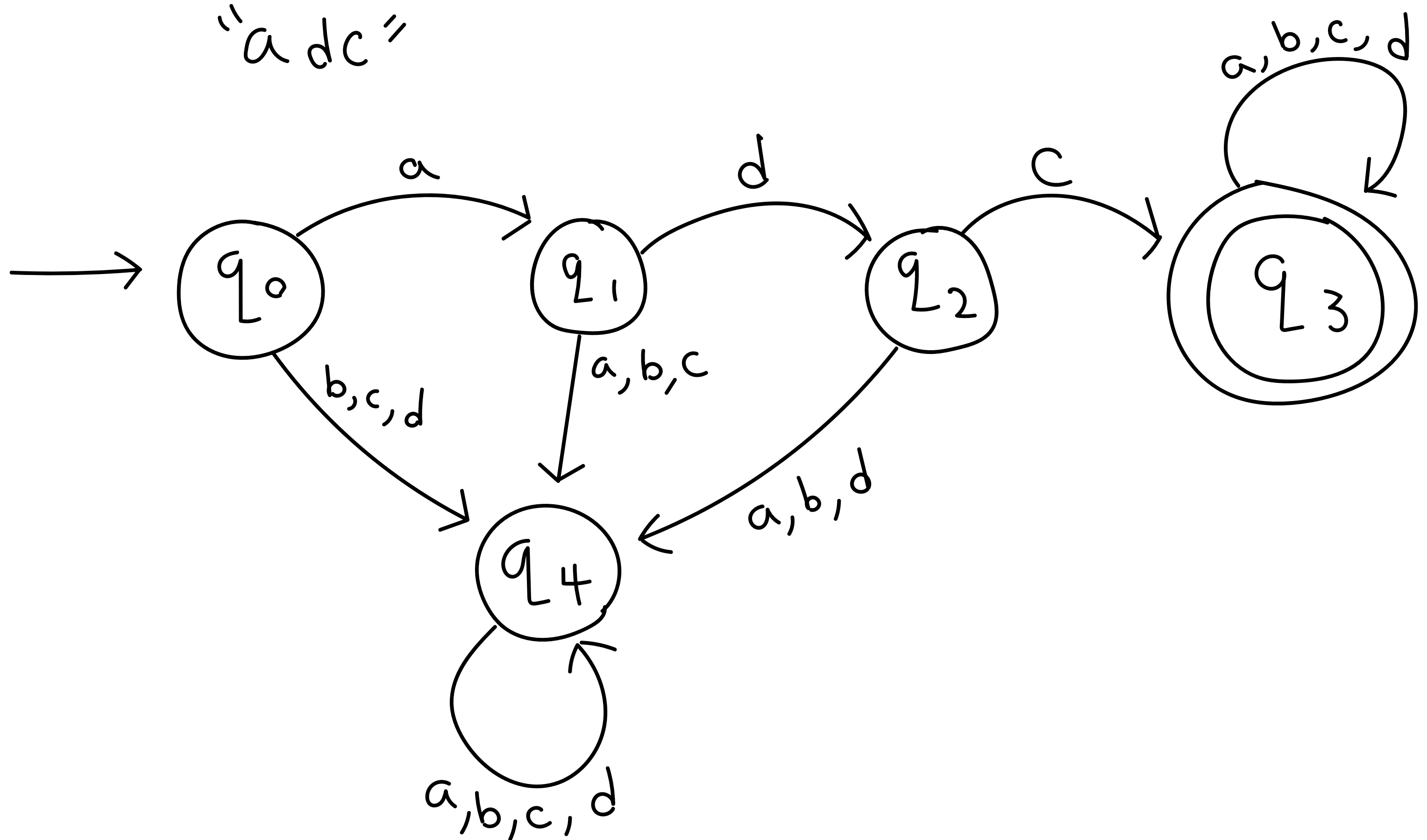


Problem 4

Consider the alphabet $\Sigma = \{a, b, c, d\}$. Show formally that the language L that contains all strings that begin with "adc" is regular.

To Show that a language is regular, One needs to Show that the language Can be produced by a DFA.

L = all strings that contain the prefix "adc"

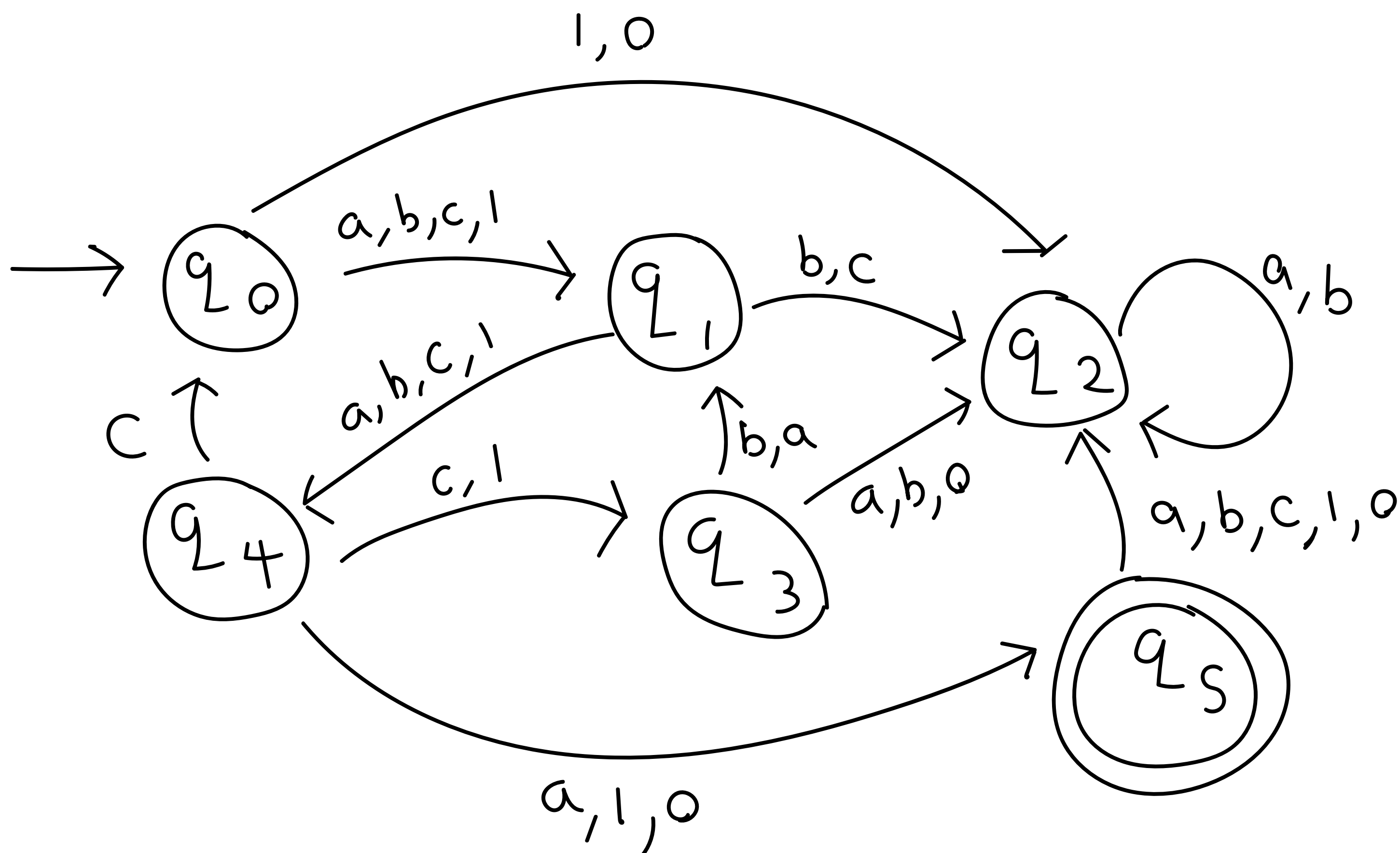


Since a DFA exists for language L , L is a regular language.

Problem 5

Pick an alphabet Σ and design an arbitrary non-deterministic finite accepter (NFA) on Σ . Give one string example this accepted and one string example that is rejected.

$$\Sigma = \{a, b, c, l, o\}$$



accepted: $aacbc l$

rejected: oab