

Formal Languages Homework 2

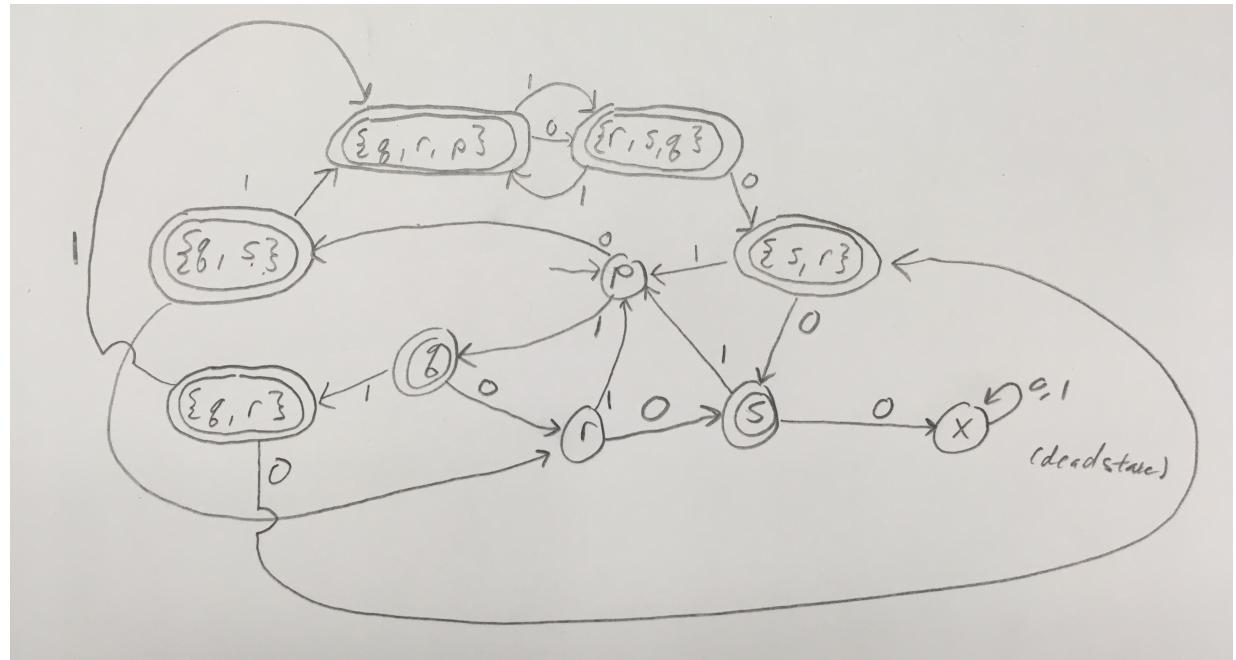
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1 Problem 2.3.2

Convert to a DFA the following NFA:

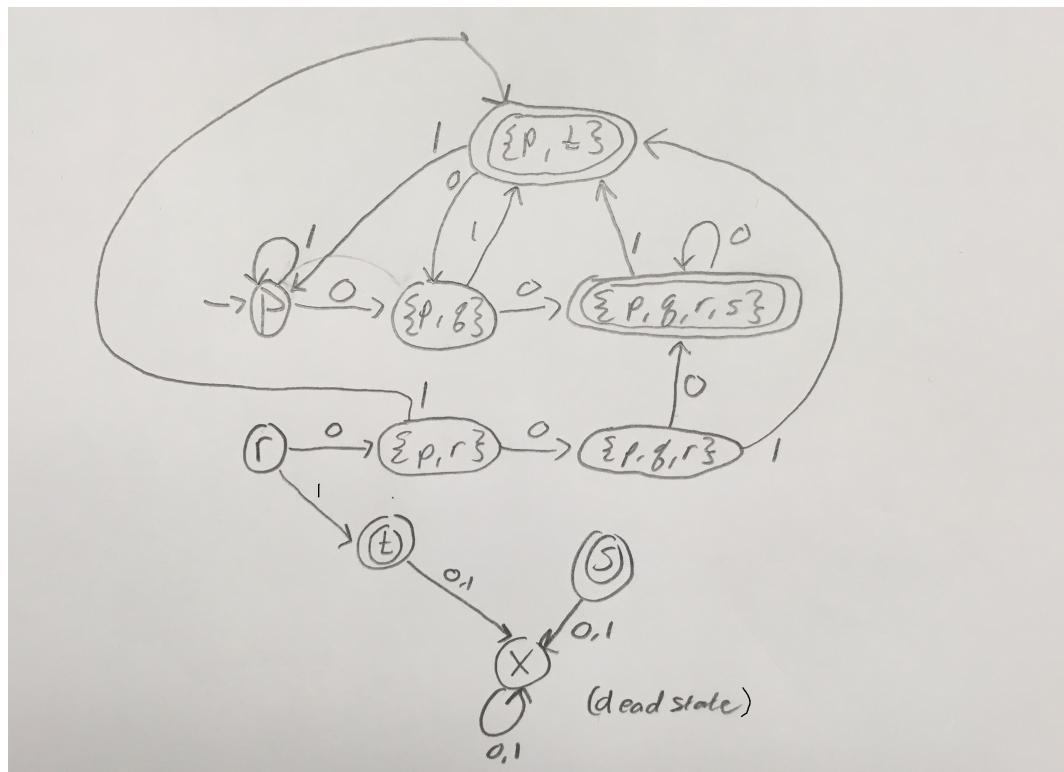
	0	1
$\rightarrow p$	$\{q, s\}$	$\{q\}$
$*q$	$\{r\}$	$\{q, r\}$
r	$\{s\}$	$\{p\}$
$*s$	\emptyset	$\{p\}$



2 Problem 2.3.3

Convert the following NFA to a DFA and informally describe the language it accepts.

	0	1
$\rightarrow p$	$\{p, q\}$	$\{p\}$
q	$\{r, s\}$	$\{t\}$
r	$\{p, r\}$	$\{t\}$
s, s	\emptyset	\emptyset
s, t	\emptyset	\emptyset

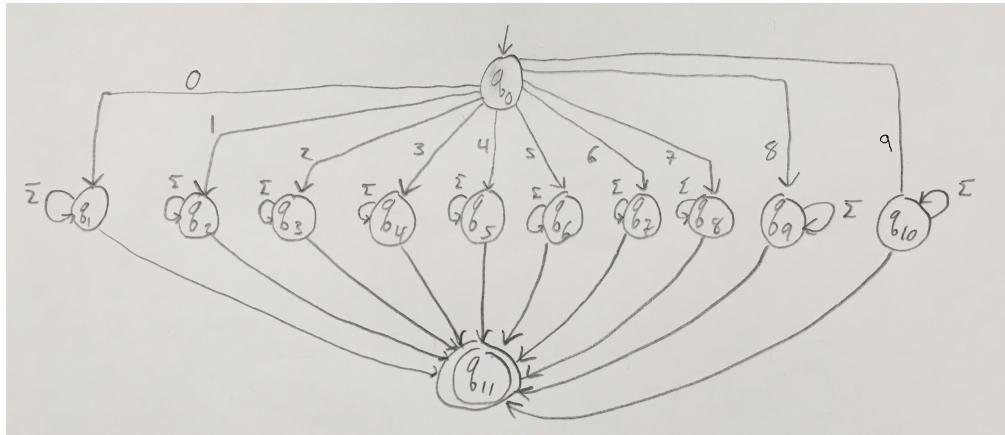


The language accepted by the NFA/DFA is all strings ending in 00, or 01.

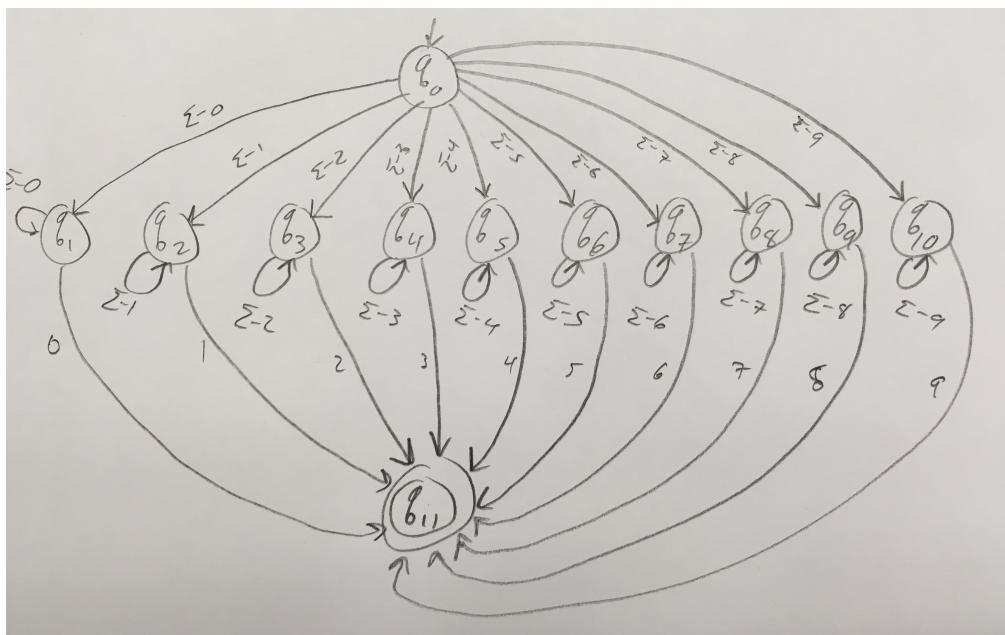
3 Problem 2.3.4

Give nondeterministic finite automata to accept the following languages. Try to take advantage of nondeterminism as much as possible

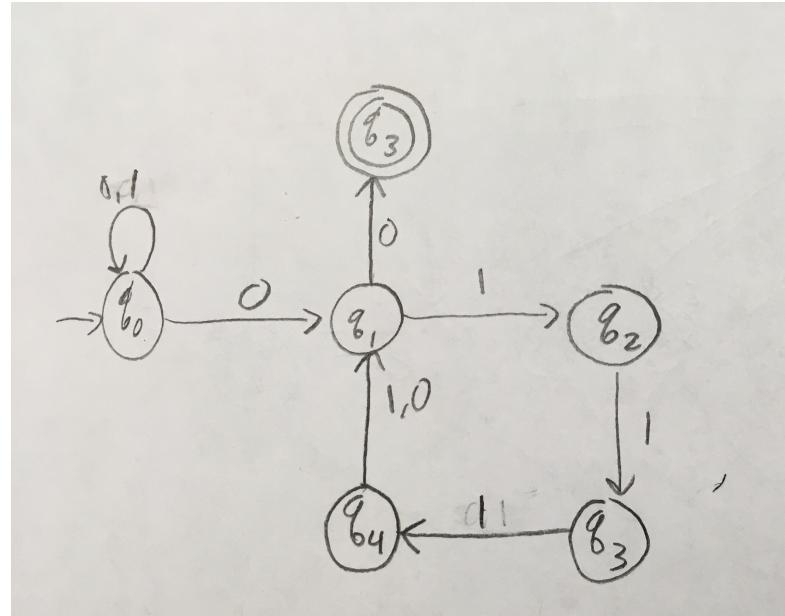
- 3.1 a). The set of strings over alphabet $\{0, 1, \dots, 9\}$ such that the final digit has appeared before



- 3.2 b). The set of strings over alphabet $\{0, 1, \dots, 9\}$ such that the final digit has not appeared before



- 3.3 c). The set of strings of 0's and 1's such that there are two 0's separated by a number of positions that is a multiple of 4. Note that 0 is an allowable multiple of 4



4 Problem 2.4.1

Design NFA's to recognize the following sets of strings:

- 4.1 a). abc, abd , and $aacd$, Assume the alphabet is $\{a, b, c, d\}$.
- 4.2 b). $0101, 101$, and 011 .
- 4.3 c). ab, bc , and ca . Assume the alphabet is $\{a, b, c\}$.

5 Problem 2.4.2b

Convert each of your NFA's from Problem 2.4.1 to DFA's (We only complete part b here).
