Formal Languages Homework 2

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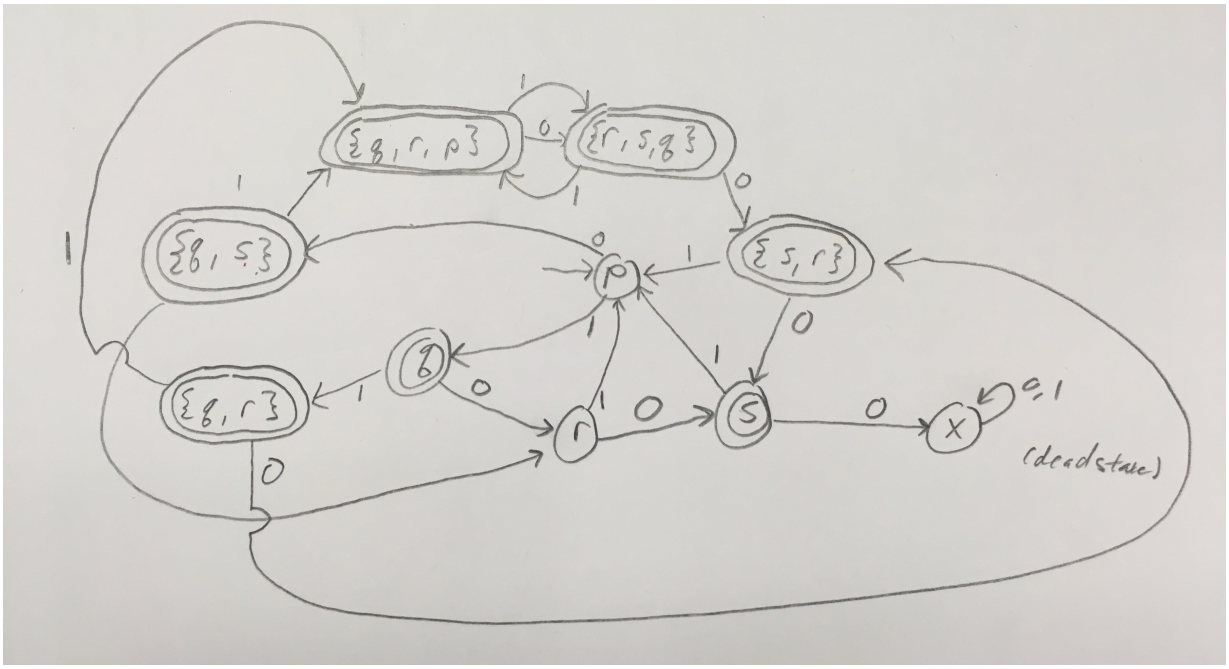
1 Problem 2.3.2

Convert to a DFA the following NFA:

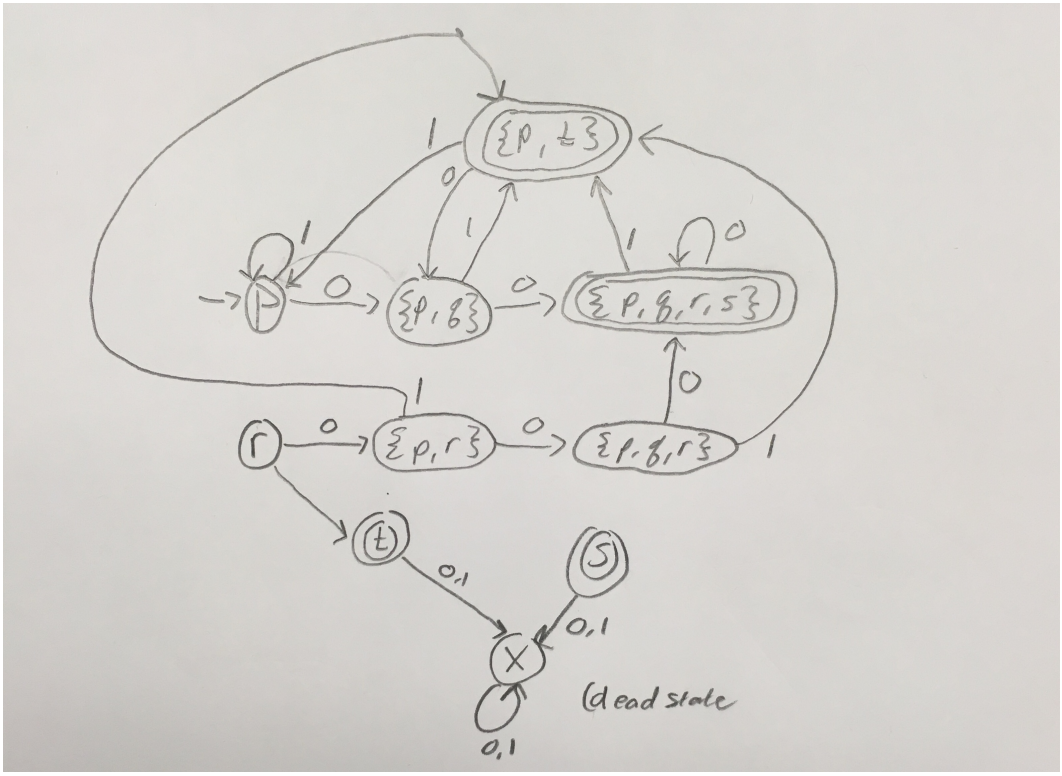
	0	1
$\rightarrow p$	$\{q, s\}$	$\{q\}$
$*q$	$\{r\}$	$\{q, r\}$
r	$\{s\}$	$\{p\}$
$*s$	$\emptyset$	$\{p\}$



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	$\{p, r\}$	$\{t\}$
$*s$	$\emptyset$	$\emptyset$
$*t$	$\emptyset$	$\emptyset$



The language accepted by the NFA/DFA is all strings ending in 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 $\{0, 1, ..., 9\}$ such that the final digit has appeared before

3.2 b). The set of strings over alphabet $\{0, 1, ..., 9\}$ 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).
