Homework 2

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1 Exercise 2.3.2

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

2 Exercise 2.3.3

This DFA accepts the language containing strings of 0's and 1's that end in one of the following: 00, 01, 001.

	0	1	
start→	$\{p\}$	$\{p,q\}$	$\{p\}$
	$\{q\}$	$\{r,s\}$	$\{t\}$
	$\{r\}$	$\{p,r\}$	$\{t\}$
*	$\{s\}$	$\emptyset$	$\emptyset$
*	$\{t\}$	$\emptyset$	$\emptyset$
	$\{p,q\}$	$\{p,q,r,s\}$	$\{p\}$
*	$\{r,s\}$	$\{p,q\}$	$\{t\}$
	$\{p,r\}$	$\{p,q,r\}$	$\{p,t\}$
	$\emptyset$	$\emptyset$	$\emptyset$
*	$\{p,q,r,s\}$	$\{p,q,r\}$	$\{p,t\}$
	$\{p,q,r\}$	$\{p,q\}$	$\{p,t\}$
*	$\{p,t\}$	$\{p,q\}$	$\{p\}$

3 Exercise 2.3.4(a)

	0	1	...	9
$\rightarrow s$	$a_0 \cup \{w_0, ..., w_9\} \cap w_0$	$a_1 \cup \{w_0, ..., w_9\} \cap w_1$	...	$a_9 \cup \{w_0, ..., w_9\} \cap w_9$
$^*a_0$	$\emptyset$	$\emptyset$	...	$\emptyset$
w_0	a_0	w_0	...	w_0
$^*a_1$	$\emptyset$	$\emptyset$	...	$\emptyset$
w_1	w_1	a_1	...	w_1
...	...	...	...	...
$^*a_9$	$\emptyset$	$\emptyset$	...	$\emptyset$
w_9	w_9	w_9	...	a_9

In this NFA, the states labeled a_i are accepting states for the symbol i. The states labeled w_i are "waiting states" for the symbol i. Waiting states will transition to themselves on all input that is not i and when i is encountered, they transition to a_i. In the start state, this NFA will transfer to nine waiting states and one accepting state upon reading the first symbol j. These states will be $a_j \cup \{w_0, ..., w_9\} \cap w_j$.

4 Exercise 2.3.4(b)