Homework 1 Solutions

DISCLAIMER: The solutions presented below are incomplete and might be insufficient to get full grade on the homework. They do not model acceptable solutions, but rather present an idea of how a certain problem can be approached. A diligent student should be able to work out complete solutions. Please report any mistakes that you find to the instructor and TA(s).

1. (a)

	0	1
$\rightarrow p$	q	p
q	f	p
$*f$	f	p

(b)

	0	1
$\rightarrow p$	q	p
q	r	p
r	s	p
$*s$	s	s

(c)

	0	1
$\rightarrow p$	q	p
q	q	r
r	q	s
$*s$	s	s

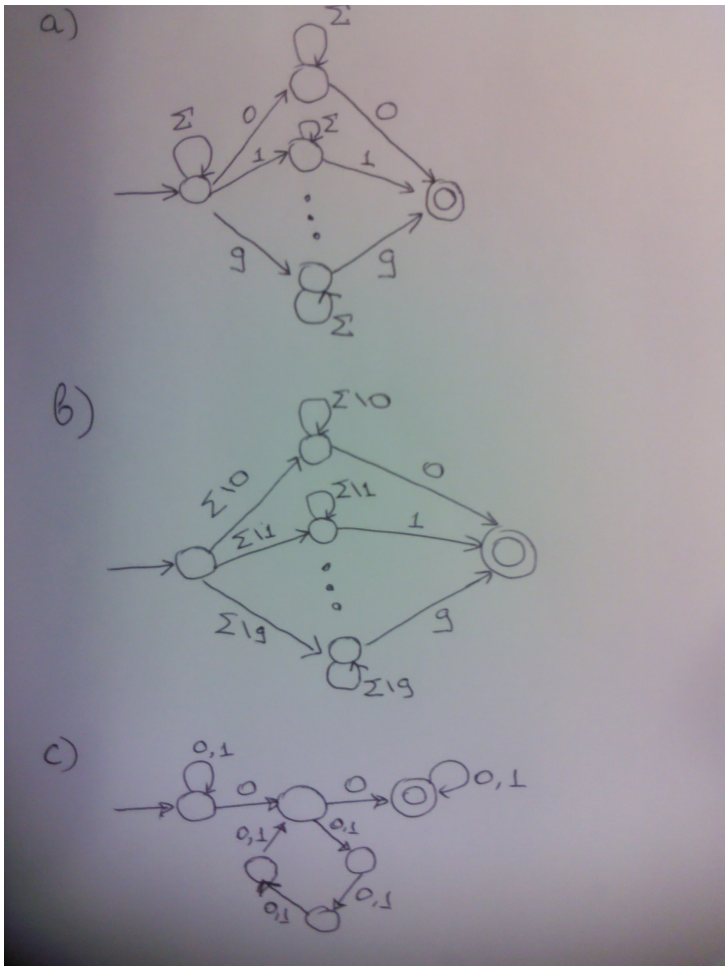
2.

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

3.

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

The language of the above automaton consists of all strings ending in two 0's or 01.

4. 

5. (a) $(a+b+c)^*a(a+b+c)^*b(a+b+c)^* + (a+b+c)^*b(a+b+c)^*a(a+b+c)^*$
   (b) $(0+1)^*1(0+1)^9$
   (c) $(0^* + \epsilon)(10+0)^*(1+\epsilon)^2(01+0)^*(0^* + \epsilon)$