

THE SUBSET CONSTRUCTION

6/11/2009
E3.1

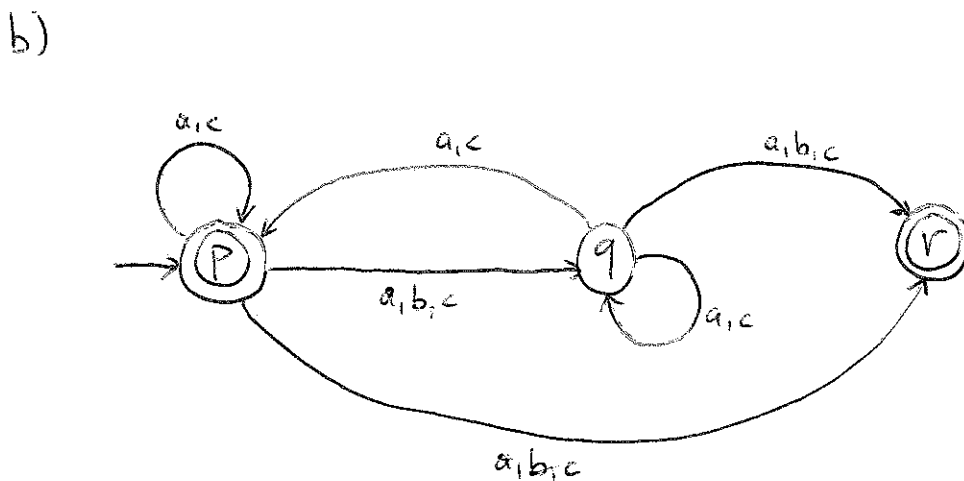
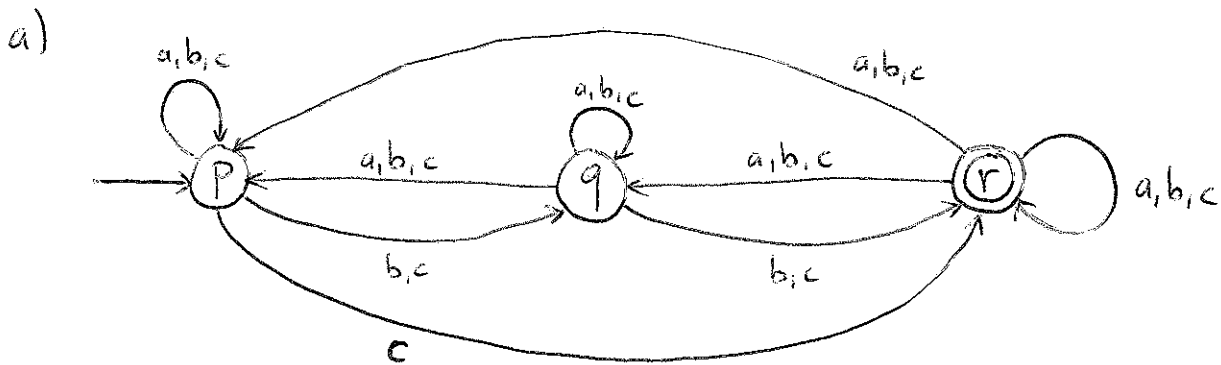
EXERCISE 1

Convert to a DFA the following NFA

	0	1
$\rightarrow q_0$	$\{q_0\}$	$\{q_0, q_2\}$
q_1	$\{q_1\}$	$\{q_0, q_2\}$
$* q_2$	$\{q_1, q_2\}$	$\{q_0, q_1, q_2\}$

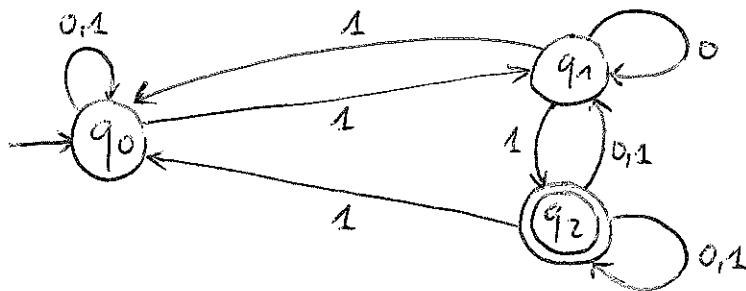
EXERCISE 2

Convert to DFA's the following NFA's



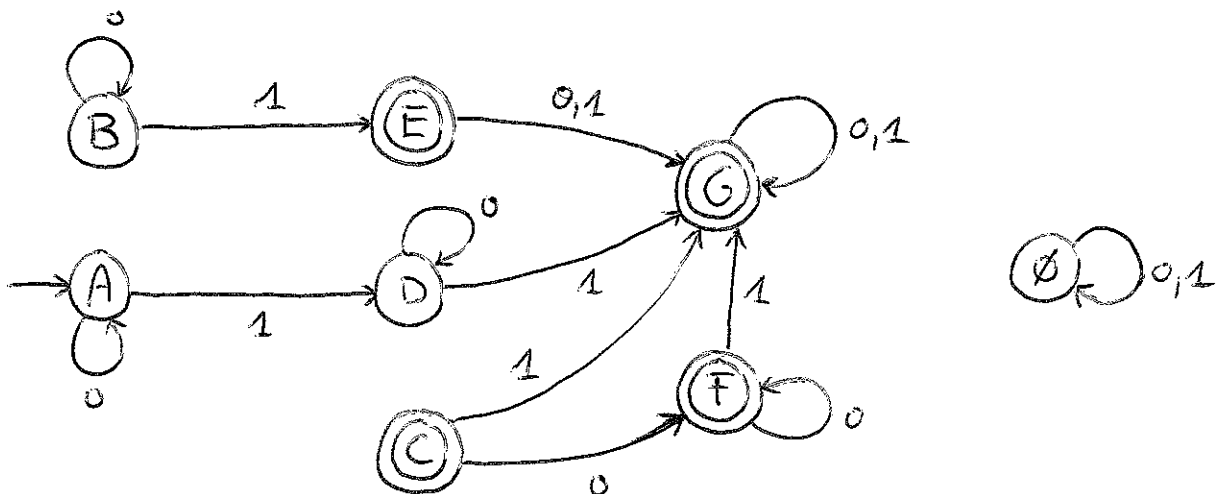
SOLUTIONS (06/11/2008)

1) Note that the NFA looks as follows.



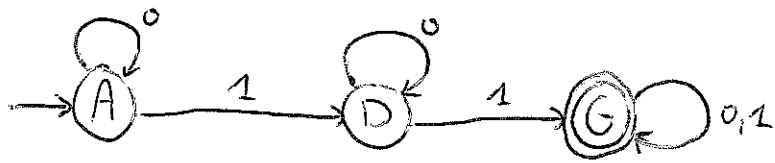
The subset construction then yields :

	0	1
$\emptyset$	$\emptyset$	$\emptyset$
$\rightarrow A = \{q_0\}$	$A = \{q_0\}$	$D = \{q_0, q_1\}$
$B = \{q_1\}$	$B = \{q_1\}$	$E = \{q_0, q_2\}$
$* C = \{q_2\}$	$F = \{q_2, q_2\}$	$G = \{q_0, q_1, q_2\}$
$D = \{q_0, q_2\}$	$D = \{q_0, q_2\}$	$G = \{q_0, q_1, q_3\}$
$* E = \{q_0, q_2\}$	$G = \{q_0, q_1, q_2\}$	$G = \{q_0, q_1, q_3\}$
$* F = \{q_1, q_2\}$	$F = \{q_1, q_2\}$	$G = \{q_0, q_1, q_3\}$
$* G = \{q_0, q_1, q_2\}$	$G = \{q_0, q_1, q_2\}$	$G = \{q_0, q_1, q_3\}$



1) can't

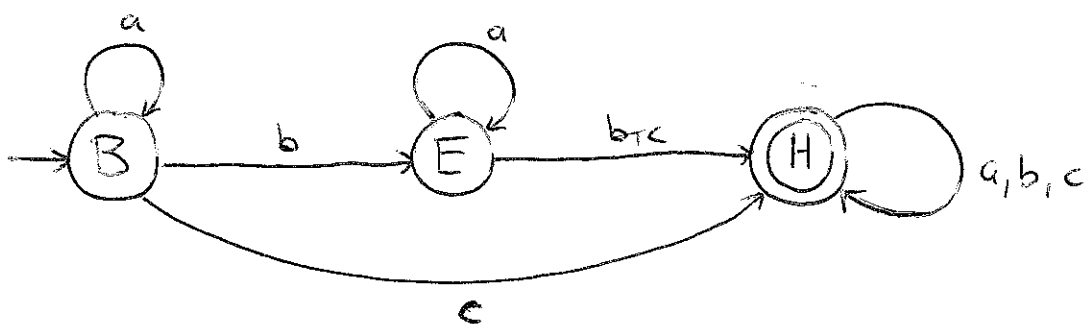
If we delete inaccessible states we get the DFA



Thus, the automaton accepts strings over $\{0,1\}$ with at least two 1's.

2a) The subset construction yields:

	a	b	c
$A = \emptyset$	A	A	A
$\rightarrow B = \{p\}$	B	E	H
$C = \{q\}$	E	H	H
$* D = \{r\}$	H	H	H
$E = \{p, q\}$	E	H	H
$* F = \{p, r\}$	H	H	H
$* G = \{q, r\}$	H	H	H
$* H = \{p, q, r\}$	H	H	H



2b) The subset construction yields :

	a	b	c
$A = \emptyset$	A	A	A
* $B = \{p\}$	H	G	H
$C = \{q\}$	H	D	H
$D = \{r\}$	A	A	A
* $E = \{p, q\}$	H	G	H
* $F = \{p, r\}$	H	G	H
$G = \{q, r\}$	H	D	H
* $H = \{p, q, r\}$	H	G	H

