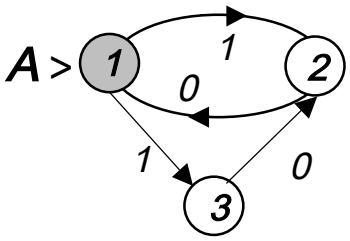
CS 302 Automata Theory
Fall 2016

Answers to Midterm

Question 1 (*35* points)

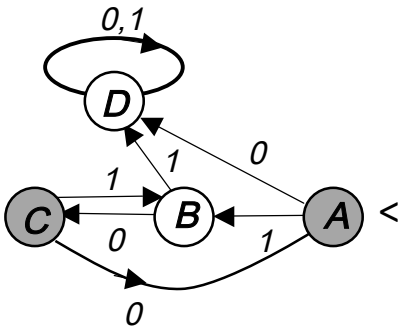


(a) *(5 pts)*

*E = ((1+1.0).0)**

(b) *(20 pts) No it is an NFA.*

σ	***q***	***q'***
0	***1* (A)***	***∅***
1	***1****	***2,3***
0	***2,3 (B)***	***1,2***
1	***2,3***	***∅***
0	***1,2* (C)***	***1***
1	***1,2****	***2,3***
0	***∅ (D)***	***∅***
1	***∅***	***∅***



(c) *(10 pts)*

The *DFA* is a minimal state machine by the table below.

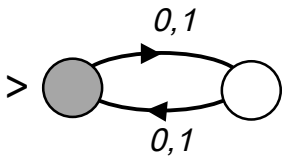
	A	B	C	D
A		x	x	x
B			x	x
C				x
D				

Question 2 (*30* points)

Given n choose $w = 0^n\ 1^n \in L_1$, then $w = xyz$ and since $|xy| \leq n$ and $|y| > 0$ we have $xy = 0^p$ and $y = 0^q$ with $p \leq n$ and $q > 0$ and $z = 0^{n-p}\ 1^n$ and therefore for $i = 0$

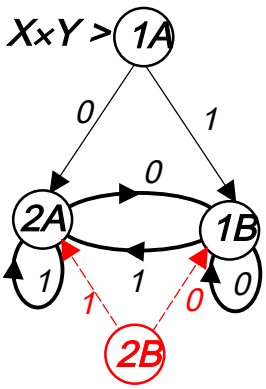
$x\ y^i\ z = x\ z = 0^{p-q+n-p}\ 1^n = 0^{n-q}\ 1^n \notin L_1$ since $q > 0$,a contradiction to pumping lemma!

For L_2 the following *DFA* accepts L_2 which therefore is a regular language



Question 3 (*35 points)*

(a)*(15 pts)* The product machine $X \times Y$ is given below



(b)*(20 pts)* $L_X \cap L_Y = \varnothing \Leftrightarrow$ the state ***2B*** ***(****which is the only element of* $F_X \times F_Y$***)*** is not reachable from ***1A*** (*which is the initial state* (s_X, s_B)) in $X \times Y$ **;** which clearly is the case.