SABANCI UNIVERSITY

Faculty of Engineering and Natural Sciences
CS 302 Automata Theory
Fall 2017

Midterm

Closed book and notes (*of paper and electronic kind****)***

Calculators are not allowed and all phones must be switched off

Duration: 60 minutes

Name :

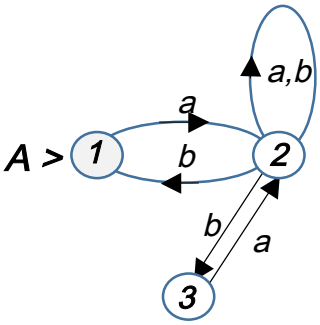
ID :

	GRADE
QUESTION 1	
QUESTION 2	
QUESTION 3	
TOTAL	

Question 1 (*35* points)

(a) *(10 pts)* For the regular expression ***E = (1.(0+1)*.0)**** sketch an *ε-NFA* with ***3*** states that accepts ***E*** interpreted as a language ; and convert this to an *equivalent NFA* again with ***3*** states but without *ε-transitions*.

(b) *(25 pts)* Consider the *NFA* ***A*** below where the input alphabet is ***Σ = (a,b)***.



Compute first an *equivalent DFA* ***B*** to ***A*** above and then an equivalent *minimal state DFA* ***C*** to ***B***.

Question 2 (*30* points)

(a) *(15 pts)* Consider the language $L = \{w \in (0+1)^* \mid \#0s \text{ in } w > \#1s \text{ in } w\}$

State whether L is a *regular* language : if so compute an ***NFA*** that accepts it ; if not, prove that it is *not regular* using the *pumping lemma*.

(b) *(15 pts)* Repeat part ***(a)*** *for* $L = \{w \in (0+1)^* \mid \#0s \text{ in } w + \#1s \text{ in } w = \textbf{an even number}\}$

Question 3 *(35 pts)*

For the finite state machine below compute the *regular expression* corresponding to the language accepted by it using the state elimination technique.