

SABANCI UNIVERSITY

Faculty of Engineering and Natural Sciences
CS 302 Automata Theory
Fall 2019

Midterm

Closed book and notes (of paper and electronic kind)

Calculators are not allowed and all phones must be switched off

Duration: 50 minutes

Name :

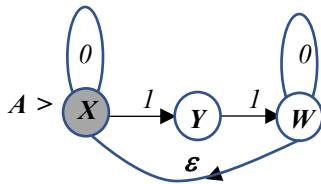
ID :

	<i>GRADE</i>
<i>QUESTION 1</i>	
<i>QUESTION 2</i>	
<i>TOTAL</i>	

Question 1 (50 points)

(a) (15 pts) Write down a regular expression E corresponding to a language with a block of 111 or 101 separated by an arbitrary number of 0 s from the left and the right ; and repeating itself an arbitrary number of times.

(b) (10 pts) Write down a regular expression E_A corresponding to the language accepted by the ϵ -NFA, A below



(c) Compute: (i) (8 pts) an NFA B equivalent to A , (ii) (8 pts) a DFA C equivalent to A and

(iii) (9 pts) a minimal state DFA D equivalent to A .

Question 2 (50 pts)

(a) (25 pts) Consider the language $L = (\omega \in \{0,1\}^* \mid \omega = 0^n 1^m ; n+m = \text{an even number})$

State whether L is a *regular language* or a *non-regular context-free language*. If it is a *regular language* compute an *NFA* A that *accepts* it; if it is a *non-regular* and a *context-free language* compute a *CFG* $G = (V, T, P, S)$ that *generates* it.

(b) (25 pts) Repeat part (a) for $L = (\omega \in \{0,1\}^* \mid \omega = 0^n 1^m ; n = m+1, n, m \text{ nonnegative integers})$