TUTORIAL 4

FINITE AUTOMATA

DUE DATE: 19th DECEMBER 2019

1. Construct a state transition diagram of a DFA that accepts all strings over {*a*, *b*, *c*} that begin with *a*, contain exactly two *b*'s, and end with *c*.

2. Construct a state transition diagram of a DFA that accepts the given set of strings over {0, 1}:
   a) contain the substring 00 or 11.
   b) begin AND end with 00.
   c) begin OR end with 00.

3. Construct a state transition diagram of a FSM that accepts the given set of strings over {*a*, *b*}:
   a) contain exactly two *b*'s.
   b) at least one b.
   c) odd number of *a*'s

4. Suppose that a language, *L*, is a *C* programing language style comment such that *L* = { *w* | *w* is a C-style comment} with input alphabet, Σ={ a, b, c, …, z, * , / }. Examples of accepted and rejected strings are shown in Table 1:

Table 1

Accepted Strings	Rejected Strings
/*abcz*/	/**
/**/	/**/bca/*aaz*/
/***/	aab/**/
/*abc*xyz*/	/*/
/*a/b*/	/ab*/

Design a DFA that accepts language, *L*.

5. A description of an automatic telephone answering machine is shown in Table 2. When a call arrives, the phone rings. If the phone is not picked up, then on the third ring, the machine answers. It plays a pre-recorded greeting requesting that the caller leave a message, then records the caller's message, and then automatically hangs up. If the phone is answered before the third ring, the machine does nothing.

Table 2

States		Input		Output	
q_0	idle (nothing is happening)	i_1	incoming ringing signal	0	default output when there is nothing interesting to say
q_1	one ring has arrived	i_2	a telephone is picked up	1	answer the phone and start the greeting message
q_2	two rings have arrived	i_3	greeting message is finish playing	2	start recording the incoming message
q_3	playing the greeting message	i_4	end of message detected	3	recorded an incoming message
q_4	recording the message	i_5	no input of interest		

a) Construct a state transition table by completing table below.

	f_s					f_o				
	i_1	i_2	i_3	i_4	i_5	i_1	i_2	i_3	i_4	i_5
q_0										
q_1										
q_2										
q_3										
q_4										

b) Based on answer in (a), construct a state transition diagram for the telephone answering machine.