Logic design (2017 fall)
Quiz # 14
Name:_____ID:_____

(100%) A Mealy machine has two inputs (X_1 and X_2) and two outputs (Z_1 and Z_2). The inputs X_1X_2 represent a 2-bit binary number, N, where X_1 is the most significant bit. If the present value of N is greater than the previous value, then Z_1 is 1. If the present value of N is less than the previous value, then Z_2 is 1. Otherwise, Z_1 and Z_2 are 0. When the first pair of inputs is received, the "otherwise" category applies.

a. (16%) List the output sequence according to the given input sequence in Table_1.
b. (20%) List the definition of each state in Table_2. The minimum number of states, including starting state, is five.

	input sequence.								
X_1	0	0	1	1	0	1	1	0	1
X_2	1	0	1	0	0	0	1	1	0
	output sequence								
Z_1	0								
Z_2	0								

Table_1

State	State meaning
S_0	Initial State
S_1	
S_2	
S_3	
S_4	

Table_2

c. (64%) Complete the state graph for this Mealy machine.

You should use $\frac{X_1\ X_2}{Z_1\ Z_2}$ to describe the state graph
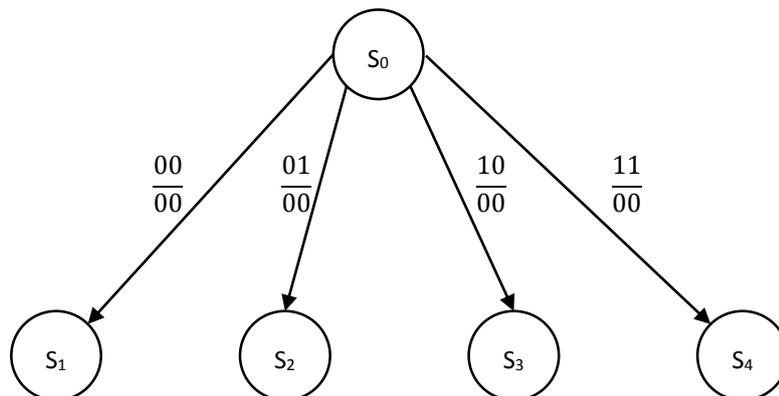
(a)

State	State meaning
S_0	Initial State
S_1	Previous input was 00
S_2	Previous input was 01
S_3	Previous input was 10
S_4	Previous input was 11

(b)

	input sequence.								
X_1	0	0	1	1	0	1	1	0	1
X_2	1	0	1	0	0	0	1	1	0
	output sequence								
Z_1	0	0	1	0	0	1	1	0	1
Z_2	0	1	0	1	1	0	0	1	0

(c)