

Logic design (2018 fall)
Quiz # 15

Name: _____ ID: _____

1. (100%) The state tables for two sequential circuits N_1 and N_2 are shown below.
- (60%) Use the implication table shown in Table_1 to prove whether N_1 and N_2 are equivalent.
 - (20%) Which states in circuit N_1 are equivalent?
 - (20%) Which states in circuit N_2 are equivalent?

Present State	Circuit N_1 Next State		Output
	X = 0	X = 1	
S_0	S_4	S_0	1
S_1	S_5	S_1	1
S_2	S_4	S_3	0
S_3	S_4	S_2	0
S_4	S_1	S_3	0
S_5	S_1	S_2	0

Present State	Circuit N_2 Next State		Output
	X = 0	X = 1	
A	D	B	0
B	A	B	0
C	A	C	1
D	A	D	1

S_0	A-S4 C-S0	A-S4 D-S0	A-S4 C-S0	A-S4 D-S0
S_1	A-S5 C-S0	A-S5 D-S1	A-S5 C-S0	A-S5 D-S1
S_2	D-S4 B-S3	A-S4 B-S3	A-S4 B-S3	A-S4 B-S3
S_3	D-S4 B-S2	A-S5 B-S2	A-S5 B-S2	A-S5 B-S2
S_4	D-S1 B-S3	A-S1 B-S3	A-S1 B-S3	A-S1 B-S3
S_5	D-S1 B-S2	A-S1 B-S2	A-S1 B-S2	A-S1 B-S2
	A	B	C	D

Table_1

- (a)
 $N_1 \equiv N_2$
 $S_0 \equiv S_1 \equiv C \equiv D$
 $S_2 \equiv S_3 \equiv B$
 $S_4 \equiv S_5 \equiv A$

- (b)
 $S_0 \equiv S_1$
 $S_2 \equiv S_3$
 $S_4 \equiv S_5$

- (c)
 $C \equiv D$