Quiz 12 – to be finished in 15 minutes

Student Name:

Question 1: Design a sequential system using D flip-flops.

Design a system with the following state changes: This is a sequential circuit with three D flip-flops. The state sequence is changed with a clock as in the order of 111,110,101,100,011,010,001,000,111, 110,101,100,011,010,001,000, and repeat. There are no other input or output signals.

Draw a state transition table. The state allocation has been given.

Current State	Next State
S0 (000)	S7 (111)
S1 (001)	S0 (000)
S2 (010)	S1 (001)
S3 (011)	S2 (010)
S4 (100)	S3 (011)
S5 (101)	S4 (100)
S6 (110)	S5 (101)
S7 (111)	S6 (110)

D flip-flop excitation table

Q(t)	Q(t+1)	D
0	0	0
0	1	1
1	0	0
1	1	1

What signals should Da, Db, and Dc be to trigger the corresponding state change? Use the state transition table and the provided D flip-flop excitation table to complete the following table.

Current State	Next State	Da	Db	Dc
000	S7 (111)	1	1	1
001	S0 (000)	0	0	0
010	S1 (001)	0	0	1
011	S2 (010)	0	1	0
100	S3 (011)	0	1	1
101	S4 (100)	1	0	0
110	S5 (101)	1	0	1
111	S6 (110)	1	1	0

Grading: if the first table is wrong but the second table is correct using wrong state information, -4

if the first table is wrong and the second table is also wrong, -6 or -7