CE2210, Sec. B
Homework 6

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Due May 8, 2019

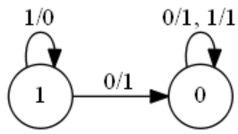
1. (a) Boolean Equations

$$f(t) = \overline{p(t) \cdot A(t)}$$
$$D_A(t) = p(t) \cdot A(t)$$

(b) State Table

Input $p(t)$	State $A(t)$	Output $f(t)$	Next State $A(t+1)$
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

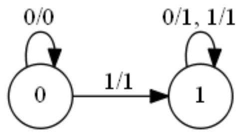
(c) State Diagram



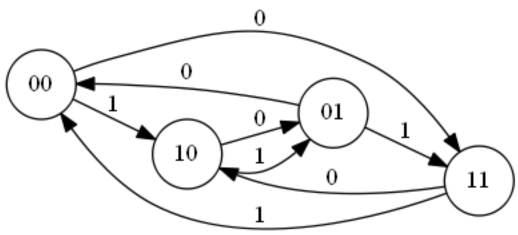
2. (a) State Table

Input $c(t)$	State $X(t)$	Output $T(t)$	Next State $X(t+1)$
0	0	0	0
0	1	1	1
1	0	1	1
1	1	1	1

(b) State Diagram



3. State Diagram

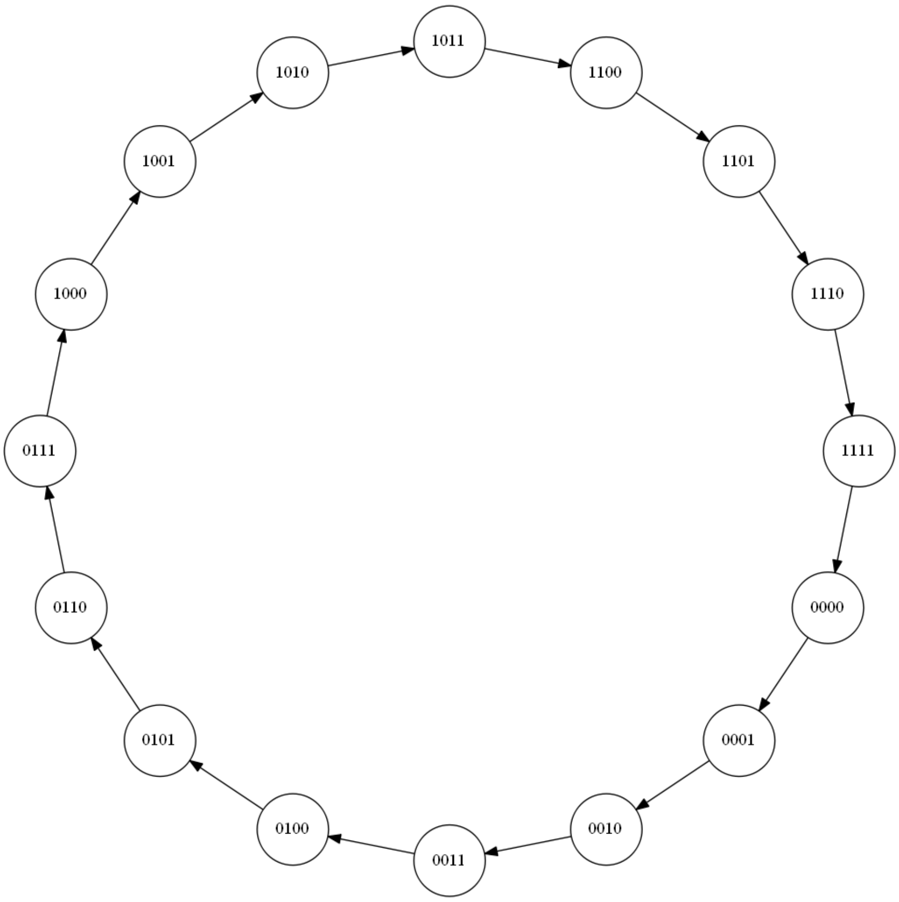


4. (a) State Table

Inputs $d_1(t)$	Inputs $d_0(t)$	State $Q(t)$	Next State $Q(t+1)$
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

(b) Circuit Diagram

5. (a) State Diagram



(b) State Table

States				Next States			
$A_3(t)$	$A_2(t)$	$A_1(t)$	$A_0(t)$	$A_3(t{+}1)$	$A_2(t{+}1)$	$A_1(t{+}1)$	$A_0(t{+}1)$
0	0	0	0	0	0	0	1
0	0	0	1	0	0	1	0
0	0	1	0	0	0	1	1
0	0	1	1	0	1	0	0
0	1	0	0	0	1	0	1
0	1	0	1	0	1	1	0
0	1	1	0	0	1	1	1
0	1	1	1	1	0	0	0
1	0	0	0	1	0	0	1
1	0	0	1	1	0	1	0
1	0	1	0	1	0	1	1
1	0	1	1	1	1	0	0
1	1	0	0	1	1	0	1
1	1	0	1	1	1	1	0
1	1	1	0	1	1	1	1
1	1	1	1	0	0	0	0

(c) Boolean Equations

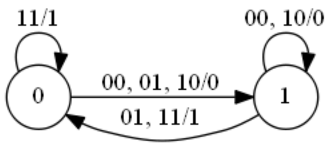
$$
\begin{aligned}
D_3(t) &= A_3(t)\overline{A}_2(t)+A_3(t)\overline{A}_1(t)+A_3(t)\overline{A}_0(t)+\overline{A}_3(t)A_2(t)A_1(t)A_0(t)\\
D_2(t) &= A_2(t)\overline{A}_1(t) + A_2(t)\overline{A}_0(t) + \overline{A}_2(t)A_1(t)A_0(t)\\
D_1(t) &= A_1(t) \oplus A_0(t)\\
D_0(t) &= \overline{A}_0(t)
\end{aligned}
$$

(d) Circuit Diagram

6. (a) State Table

Input		State	Output	Next State
$a(t)$	$b(t)$	$x(t)$	$f(t)$	$x(t+1)$
0	0	0	0	1
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	1
1	1	0	1	0
1	1	1	1	0

(b) State Diagram



7. State Table

Input	States		Outputs		Next States		TFF	
$w(t)$	$x(t)$	$y(t)$	$f_x(t)$	$f_y(t)$	$x(t+1)$	$y(t+1)$	$T_x(t)$	$T_y(t)$
0	0	0	1	0	1	0	1	0
0	0	1	1	0	1	0	1	1
0	1	0	0	0	0	0	1	0
0	1	1	0	0	0	0	1	1
1	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	1
1	1	0	0	0	0	0	1	0
1	1	1	0	1	0	1	1	0

Boolean Equations

$f_x(t) = \overline{w}(t)\overline{x}(t)$
$f_y(t) = w(t)x(t)y(t)$
$T_x(t) = \overline{w}(t) + x(t)$
$T_y(t) = \overline{w}(t)y(t) + \overline{x}(t)y(t)$

Circuit Diagram on back of this page.