

HW7 Solution ECE2060

2018

Lectures Covered: Lessons 16 to 17

Show all relevant steps. Don't just write down the answers.

Late HWs will not be accepted. Lecture Students: turn in your HW in class. Recitation students: turn in your HW at the ECE Office Front Desk. **HWs turned-in anywhere else will not be accepted.**

Show your work on these pages, attach additional pages if necessary.

- Be sure to organize the pages **in order** and **staple** them all together, **otherwise you will lose one point**
- Fill out the following section. **You will lose an additional point if you fail to provide these details**

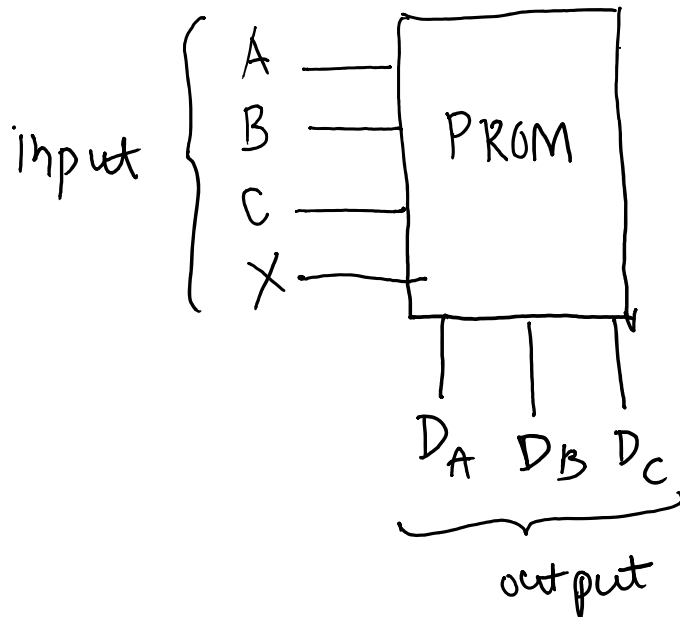
Your Last Name _____ Your First Name _____

1. Lecture Student _____ or Recitation Student _____ (check one)
2. If Recitation then fill out the following
Name of recitation instruction _____ Date/time of recitation _____

Problems start from next page. Both the problems will be graded, each graded problem is worth 5 points.

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- 1) Implement the state table shown on page 6 of Lesson 24 by using a PROM and D-Flip Flops. Do not use AND or OR gates. Use Grey Scale encoding of states. No need to simplify the logic expressions.



PROM is shown

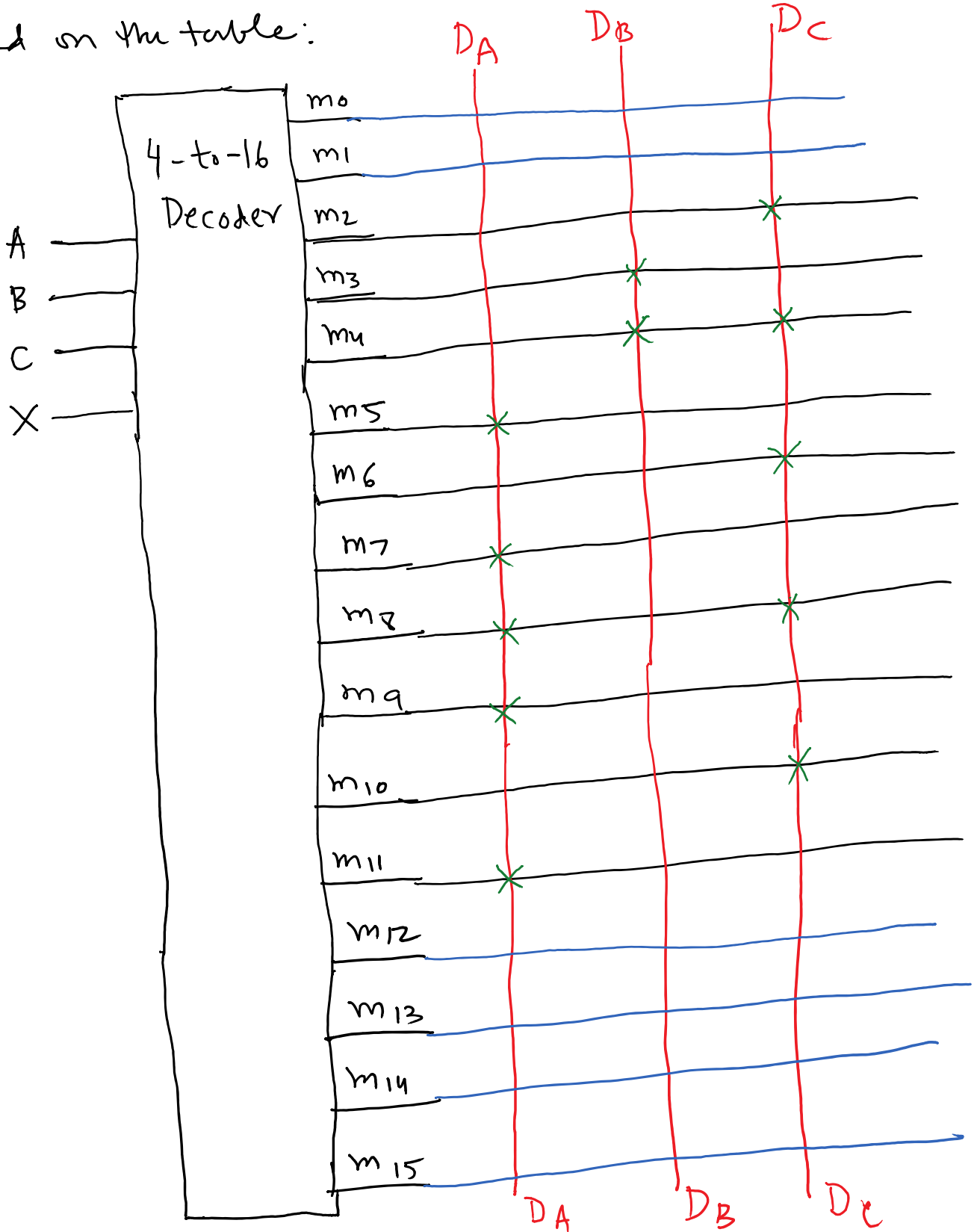
1) Continued ...

for D flip-flops

next states

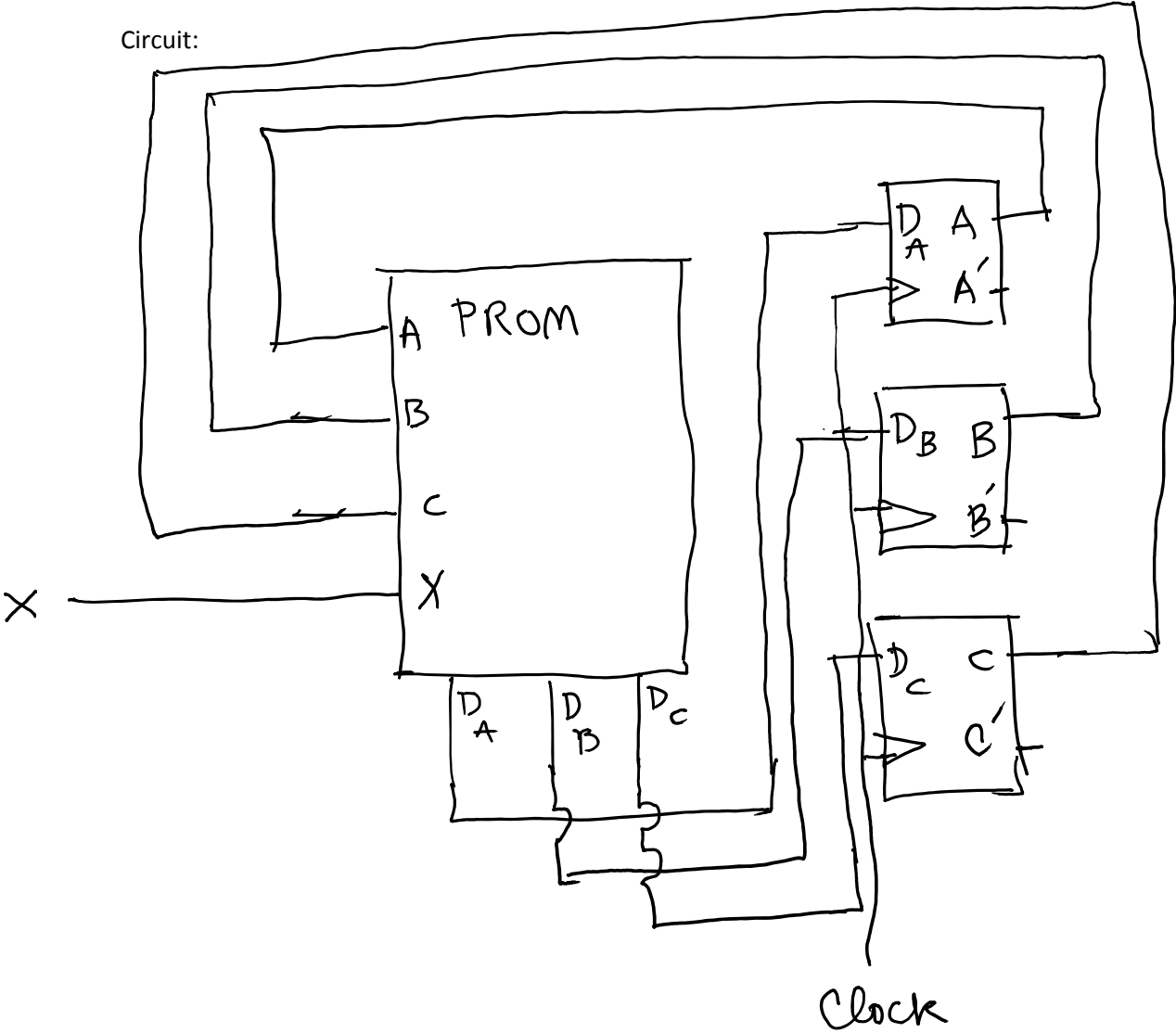
$$D_A = A^+ \quad D_B = B^+ \quad D_C = C^+$$

Based on the table:



1) continued

Circuit:



- 1) Implement the state machine diagram shown on Page 5 of Lesson 26 by using a Programmable Logic Array and D-Flip Flops.. Do not use AND or OR gates. Use one-hot coding to encode the states. No need to simplify the logic expressions.

The flip flop input and output equations were calculated on page 4 of lesson 27

$$D_{S_0} \rightarrow S_0^+ = S_1 \cdot \bar{A} + S_2 \cdot (A+B) + S_3 \cdot A \cdot B$$

$$D_{S_1} \rightarrow S_1^+ = S_0$$

$$D_{S_2} \rightarrow S_2^+ = S_1 \cdot A + S_3 \cdot A \cdot \bar{B}$$

$$D_{S_3} \rightarrow S_3^+ = S_2 \cdot \bar{A} \cdot \bar{B} + S_3 \cdot \bar{A}$$

Output Equations

$$Y = S_0 \cdot \bar{B} + S_1 \cdot A \cdot \bar{B} + S_2 \cdot (A+B)$$

$$Z = S_1 \cdot (\bar{A} + \bar{B}) + S_2 \cdot \bar{A} \cdot \bar{B} + S_3$$

2) Continued...

PLA table

Prod. terms	inputs				A	B	D _{S0}	D _{S1}	D _{S2}	D _{S3}	Y	Z
	S ₀	S ₁	S ₂	S ₃								
S ₁ \bar{A}	-	1	-	-	0	-	1	0	0	0	0	0
S ₂ A	-	-	1	-	1	-	1	0	0	0	1	0
S ₂ B	-	-	1	-	-	1	1	0	0	0	1	0
S ₃ AB	-	-	-	1	1	1	1	0	0	0	0	0
S ₀	1	-	-	-	-	-	0	1	0	0	0	0
S ₁ A	-	1	-	-	1	-	0	0	1	0	0	0
S ₃ $\bar{A}\bar{B}$	-	-	-	1	1	0	0	0	1	0	0	0
S ₂ $\bar{A}\bar{B}$	-	-	1	-	0	0	0	0	0	1	0	1
S ₃ \bar{A}	-	-	-	1	0	-	0	0	0	1	0	0
S ₀ \bar{B}	1	-	-	-	-	0	0	0	0	0	1	0
S ₁ $\bar{A}\bar{B}$	-	1	-	-	1	0	0	0	0	0	1	0
S ₁ \bar{A}	-	1	-	-	0	-	0	0	0	0	0	1
S ₁ \bar{B}	-	1	-	-	-	0	0	0	0	0	0	1
S ₃	-	-	-	1	-	-	0	0	0	0	0	1

