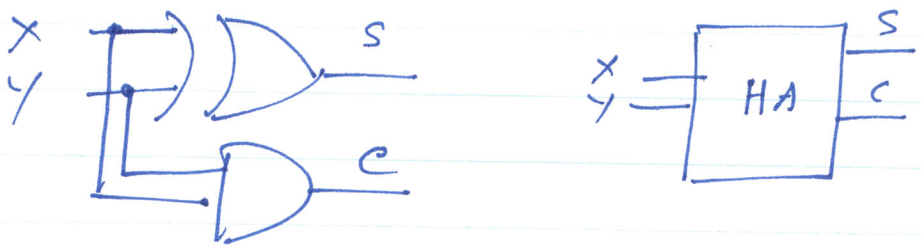
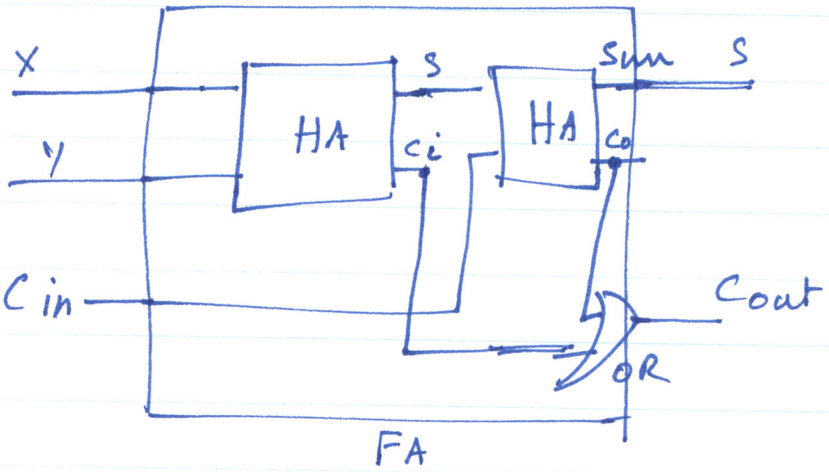
Sept 25, 2017

1. HA → FA
2. FA – Design version 2
3. MSI circuit: 3 x 8 Decoder

(last class) (new)

(1)





Building larger circuits out of basic or smaller-sized circuits.

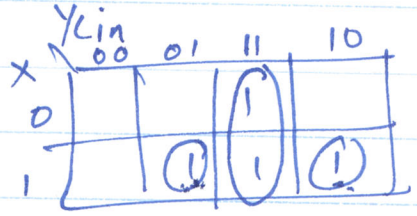
(2) "Reuse" 2 functions Sum & Carry that are Co-tenants on the same chip.

Can we reuse some of existing circuitry?

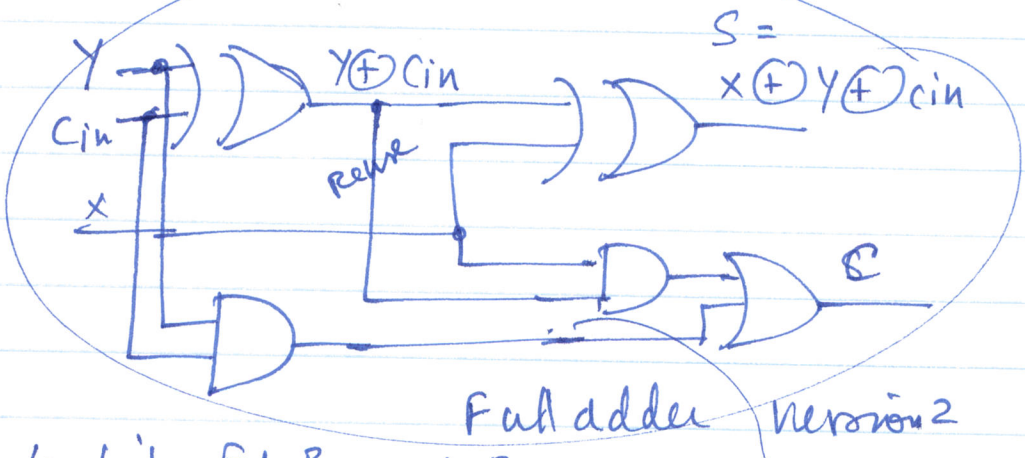
from last class: Sept 25, 2017

$S(x,y,z) = x \oplus y \oplus c_{in}$

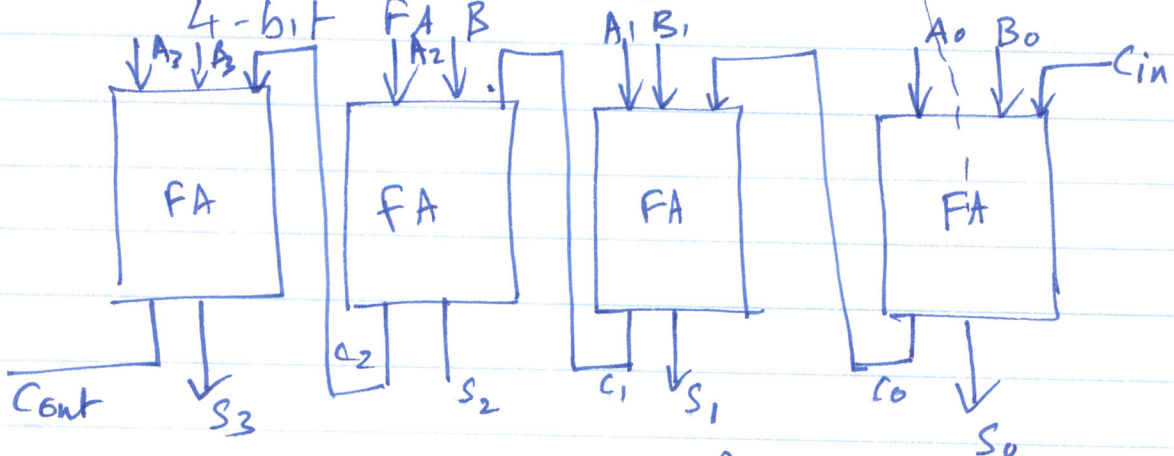
Carry $C(x,y,z)$



$$C(x,y,z) = yC_{in} + xy'c_{in} + xyc_{in}'$$
$$= yC_{in} + x(y'c_{in} + yc_{in}')$$
$$= yC_{in} + x(y \oplus c_{in})$$



Full adder version 2

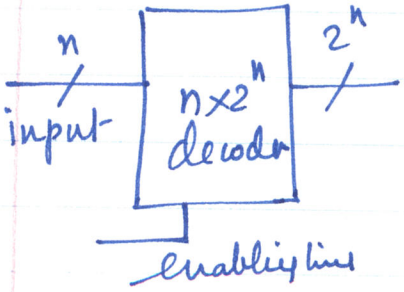


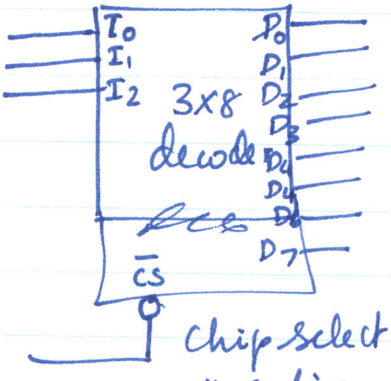
MSI

Sept 25th, 2017

Decoder MSI Circuit

1. Block diagram
   - inputs, names ⇒ Symbols
   - outputs, names
   - label or name of function
   - size of function
   - control lines
   - power ×
2. Explain the function
3. Uses of the MSI chip
4. internal logic diagram/Architecture
5. Implementing other function using the decoder
6. ~~Math~~ Building larger decoders with smaller-sized decoders.





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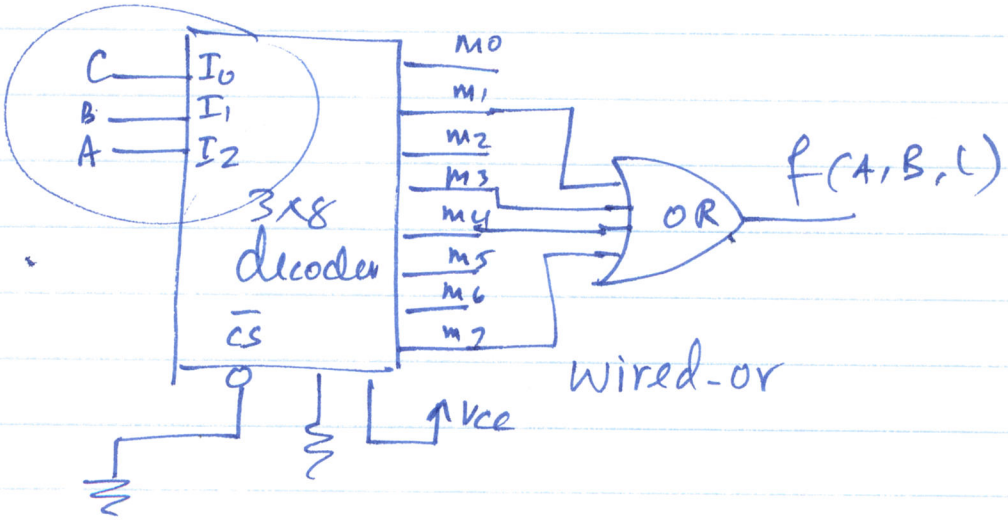
I_2	I_1	I_0	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7
0	0	0	✓	–	–	–	–	–	–	–
0	0	1	–	✓	–	–	–	–	–	–
0	1	0	–	–	✓	–	–	–	–	–
0	1	1	–	–	–	✓	–	–	–	–
1	0	0	–	–	–	–	✓	–	–	–
1	0	1	–	–	–	–	–	✓	–	–
1	1	0	–	–	–	–	–	–	✓	–
1	1	1	–	–	–	–	–	–	–	✓

Use: address decoding

$f(A,B,C) = \Sigma(4,7,3,1)$



Building larger circuits out of smaller circuits.

Build a 4 X 16 decoder using a 3x8 decoder.

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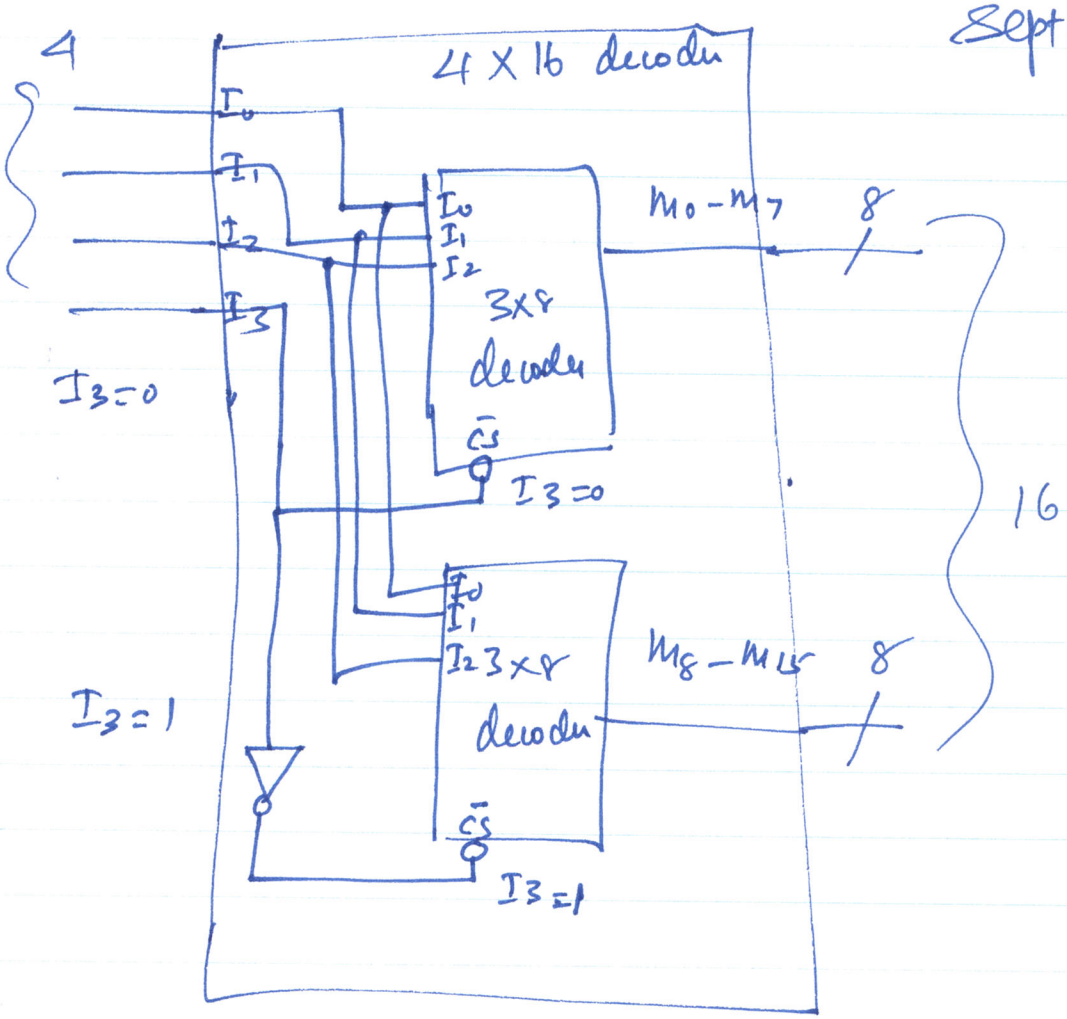

I_3	I_2	I_1	I_0	
0	0	0	0	$m_0 - m_7$
.	0	0	1	
.	0	1	0	
.	0	1	1	
.	1	0	0	
.	1	0	1	
.	1	1	0	
1	1	1	1	
1				$m_8 - m_{15}$
.				
.				
.				
1				