

# Lab 2

$$1) m = AB' + A'B$$

$$2) M = (A+B) \cdot (A'+B')$$

		B		A	
Sum	AB	00	01	11	10
Cin	0	0	1	0	1
Cin	1	1	0	1	0

$$3) m = A'B'C + A'BC' + ABC + AB'C'$$

$$4) M = (A+B+C)(A+B'+C')(A'+B+C)(A'+B+C')$$

Cout		A			
AB		00	01	11	10
C <sub>in</sub>	0	0	0	1	0
C <sub>in</sub>	1	0	1	1	1

$$3) m = AC + AB + BC$$

$$4) M = (A+B)(A+C)(\cancel{A'+B+C})$$

$$(B+C)$$

$$5) \Sigma_1 m = AC' + BC'D' + ABD' \quad \Sigma_2 m = A'C + A'B'D + B'CD$$

		B			
		00	01	11	10
C	AB	00	01	11	10
	00	0	1	1	1
	01	0	0	1	1
	11	0	0	0	0
	10	0	0	1	0

		B			
		00	01	11	10
C	AB	00	01	11	10
	00	0	0	0	0
	01	1	0	0	0
	11	1	1	0	1
	10	1	1	0	0

$\Sigma_3$

		B			
		00	01	11	10
C	AB	00	01	11	10
	00	1	0	0	0
	01	0	1	0	0
	11	0	0	1	0
	10	0	0	0	1

$$m = A'B'C'D' + A'BC'D + ABCD + AB'CD'$$

b)

$\begin{array}{c} AB \\ \hline CD \end{array}$		$B$			
		00	01	11	10
$C$	00	0	1	1	1
	01	0	0	1	1
	11	0	0	0	0
	10	0	0	1	0

Groups:  $A$  (columns 01, 11),  $D$  (rows 01, 11),  $C$  (rows 00, 01, 11, 10)

$\begin{array}{c} AB \\ \hline CD \end{array}$		$B$			
		00	01	11	10
$C$	00	0	0	0	0
	01	1	0	0	0
	11	1	1	0	1
	10	1	1	0	0

Groups:  $A$  (columns 01, 11),  $D$  (rows 01, 11),  $C$  (rows 00, 01, 11, 10)

$$Z_1, M = (A+B)(C'+D')(B+C')(A+D')(A+C')$$

$$Z_2, M = (C+D)(A'+B')(A'+D)(B'+C)(A'+C)$$

$Z_3$

$\begin{array}{c} AB \\ \hline CD \end{array}$		$B$			
		00	01	11	10
$C$	00	1	0	0	0
	01	0	1	0	0
	11	0	0	1	0
	10	0	0	0	1

Groups:  $A$  (columns 01, 11),  $D$  (rows 01, 11),  $C$  (rows 00, 01, 11, 10)

$$Z_3, M = (A+C')(A'+C)(B'+D)(B+D')$$

# 7,8 Multiplexer

$x_0 x_1$		$x_1$			
		00	01	11	10
S	0	0	0	1	1
	1	0	1	1	0

$x_0$

$$m = x_0 s' + x_1 s$$

$$M = (x_0 + s)(x_1 + s')$$

a) Mux 4:1

$$x_0(s_1' s_0') + x_1(s_1' s_0) + x_2(s_1 s_0') + x_3(s_1 s_0)$$