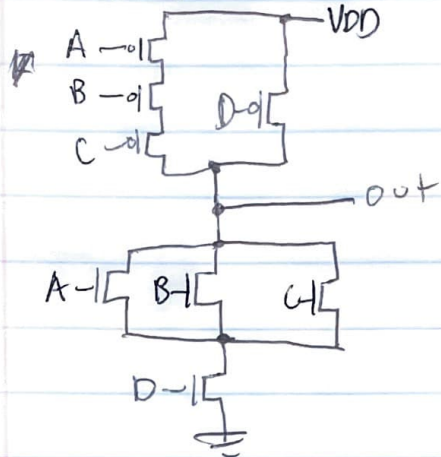
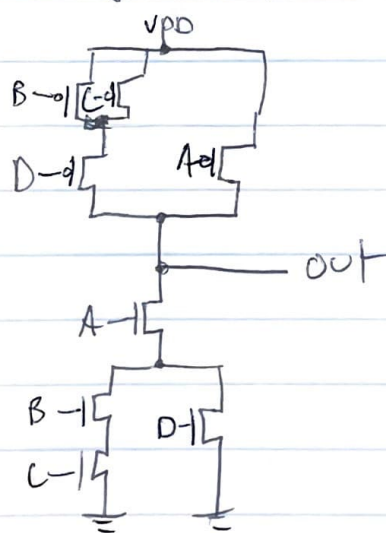


CompE303 HW1

P1.1: $F = \overline{(A+B+C)D} \Rightarrow \overline{F} = (A+B+C)D$



P1.2: $F = \overline{A(BC+D)} \Rightarrow \overline{F} = A(BC+D)$



P.3: $\overline{F} = (A+B)(C+D)(E+F+GH)$

$\hookrightarrow F = \overline{(A+B)(C+D)(E+F+GH)} = \overline{(A+B)} + \overline{(C+D)} + \overline{(E+F+GH)}$
 $= \overline{A}\overline{B} + \overline{C}\overline{D} + \overline{E}\overline{F}(\overline{G}+\overline{H})$

P2ab

	Inputs	Outputs
	$D_4 D_3 D_2 D_1$	$D'_4 D'_3 D'_2 D'_1$
First 6	A 0 0 0 0	0 1 1 0
	B 0 0 0 1	0 1 1 1
	C 0 0 1 0	1 0 0 0
	D 0 0 1 1	1 0 0 1
	E 0 1 0 0	1 0 1 0
	F 0 1 0 1	1 0 1 1
Second 6	G 0 1 1 0	0 0 0 0
	H 0 1 1 1	0 0 0 1
	I 1 0 0 0	0 0 1 0
	J 1 0 0 1	0 0 1 1
	K 1 0 1 0	0 1 0 0
	L 1 0 1 1	0 1 0 1
Don't Cares	X 1 1 0 0	
	X 1 1 0 1	
	X 1 1 1 0	
	X 1 1 1 1	

P2c

$D_4 D_3$	$D_2 D_1$	00	01	11	10
00		0	1	1	0
01		0	1	1	0
11		X	X	X	X
10		0	1	1	0

Prime implicants circled

$D_4 D_3$	$D_2 D_1$	00	01	11	10
00		1	1	0	0
01		1	1	0	0
11		X	X	X	X
10		1	1	0	0

Prime implicants circled

P2c: cont

$D_3' \backslash D_2 D_1$	00	01	11	10
$D_4 D_3$				
00	1	1	0	0
01	0	0	0	0
11	X	X	X	X
10	0	0	1	1

Prime implicants circled

$D_4' \backslash D_2 D_1$	00	01	11	10
$D_4 D_3$				
00	0	0	1	1
01	1	1	0	0
11	X	X	X	X
10	0	0	0	0

Prime implicants circled

P2d: $D_1' = \overline{D_1} = D_1$

$D_2' = \overline{D_2}$

$D_3' = \overline{D_2} \overline{D_4} \overline{D_3} + D_1 D_4$

$D_4' = D_3 \overline{D_2} + \overline{D_4} \overline{D_3} D_2$

P3a: $f = \overline{b} \overline{c} d + b \overline{c} d + a \overline{c} d + \overline{a} \overline{b} c + \overline{a} b \overline{c} d$

$a \backslash b \overline{c} d$	00	01	11	10
00	1	0	0	1
01	0	1	0	0
11	1	1	1	0
10	1	0	1	1

Prime implicants: $\overline{b} \overline{c} d, \overline{a} \overline{b} c, \overline{a} c d, d \overline{a} b, b \overline{c} d, c a b, a c d$
circled

P3b: Essential implicants: ~~$\overline{b} \overline{c} d$~~ , $\overline{a} b \overline{c} d$, $\overline{a} b \overline{c} d$

P4a: minterms of ON-set: $\{0001, 0101, 0111, 1001, 1011, 1100, 1110, 1111\}$
 $\times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times$

Col 1	Col 2	Col 3
$\sqrt{0001}$	$\begin{matrix} 0-01 \\ -001 \end{matrix}$	
$\sqrt{0101}$		
$\sqrt{1001}$	$\begin{matrix} 01-1 \\ 10-1 \end{matrix}$	
$\sqrt{1100}$		
$\sqrt{0111}$	$\begin{matrix} 11-0 \\ -111 \end{matrix}$	
$\sqrt{1011}$		
$\sqrt{1110}$	$\begin{matrix} -111 \\ 1-11 \end{matrix}$	
$\sqrt{1111}$	$\begin{matrix} 1-11 \\ 111- \end{matrix}$	

Prime implicants: $\bar{A}\bar{B}D, \bar{B}\bar{C}D, \bar{A}BD, \bar{A}\bar{B}D$
 $AB\bar{D}, BCD, ACD, ABC$

P4b: minterms of ON-set: $\{0000, 0001, 0011, 0101, 0110, 0111, 1000, 1010, 1110, 1111\}$
 $\times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times \quad \times$

Col 1	Col 2	Col 3
$\sqrt{0000}$	$\begin{matrix} 000- \\ -000 \end{matrix}$	
$\sqrt{0001}$		
$\sqrt{1000}$	$\begin{matrix} 00-1\checkmark \\ 0-01\checkmark \end{matrix}$	
$\sqrt{0011}$	$\begin{matrix} 0-01\checkmark \\ 10-0 \end{matrix}$	$\begin{matrix} 0--1 \\ 0001 \end{matrix}$
$\sqrt{0101}$	$\begin{matrix} 10-0 \\ 0-11\checkmark \end{matrix}$	
$\sqrt{0110}$	$\begin{matrix} 0-11\checkmark \\ 01-1\checkmark \end{matrix}$	
$\sqrt{1010}$	$\begin{matrix} 01-1\checkmark \\ 011-\checkmark \end{matrix}$	
$\sqrt{0111}$	$\begin{matrix} 011-\checkmark \\ -110\checkmark \end{matrix}$	$\begin{matrix} -11- \\ 0111 \end{matrix}$
$\sqrt{1110}$	$\begin{matrix} -110\checkmark \\ 1-10 \end{matrix}$	
$\sqrt{1111}$	$\begin{matrix} -111\checkmark \\ 111-\checkmark \end{matrix}$	

Prime implicants: $\bar{A}\bar{B}\bar{C}, \bar{B}\bar{C}\bar{D}, \bar{A}\bar{B}\bar{D}, \bar{A}\bar{C}\bar{D}$
 $\bar{A}D, BC$