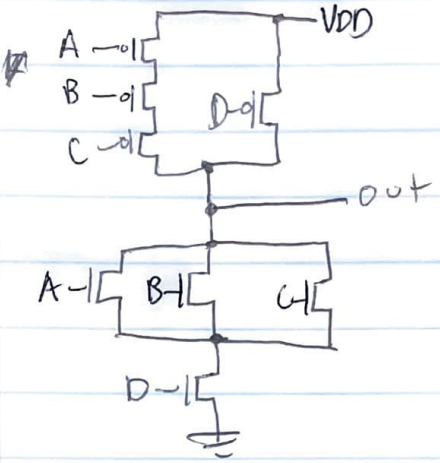
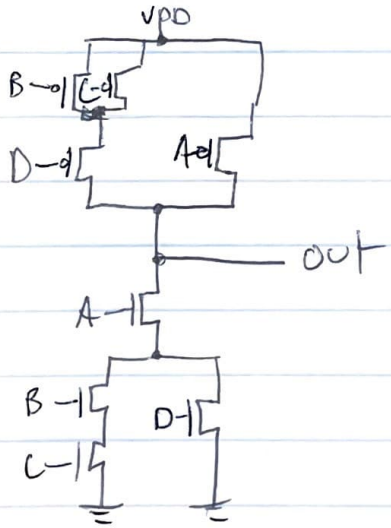
CompE303 HW1

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



P2: $F = \overline{A(BC+D)} \Rightarrow \bar{F} = A(BC+D)$



P3: $\overline{F} = (A+B)(C+D)(E+F+GH)$

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

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

P2ab

	Inputs $D_4\ D_3\ D_2\ D_1$	Outputs $D_4'\ D_3'\ D_2'\ D_1'$
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
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
X	1 1 0 0	
X	1 1 0 1	
X	1 1 1 0	
X	1 1 1 1	

First 6

Second 6

Don't Cares

P2c

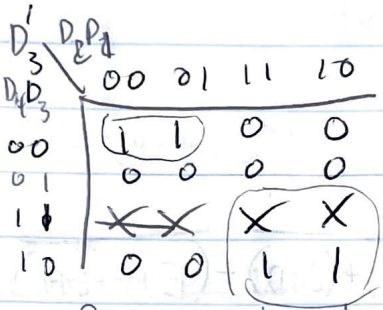
D_4D_3 \ D_2D_1	00	01	11	10
00	0	1	1	0
01	0	1	1	0
11	X	X	X	X
10	0	1	1	0

Prime implicants circled

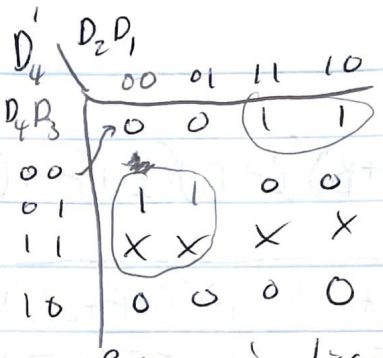
D_4D_3 \ D_2D_1	00	01	11	10
00	1	1	0	0
01	1	1	0	0
11	X	X	X	X
10	1	1	0	0

Prime implicants circled

P2c: cont



Prime implicants circled



Prime implicants circled

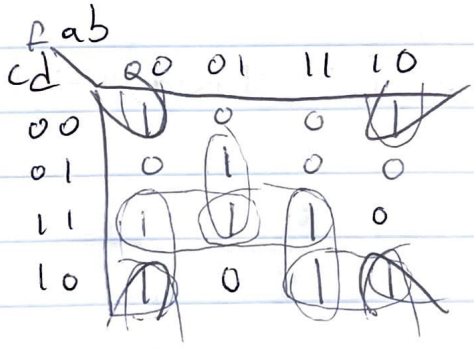
P2d: $D_1' = \quad = D_1$

$D_2' = \overline{D_2}$

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

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

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



Prime implicants: $\overline{b}\,\overline{d}$, $\overline{a}\,\overline{b}c$, $\overline{a}cd$, $d\overline{a}\overline{b}$, bcd, cab, $ac\overline{d}$

circled

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

P4a: minterms of ON-Set: {0001, 0101, 0111, 1001, 1011, 1100, 1110, 1111}

Col 1	Col 2	Col 3
√0001	0-01	
	-001	
√0101		
√1001	01-1	
√1100	10-1	
√0111	11-0	
√1011		
√1110	-111	
	1-11	
√1111	111-	

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

P4b: minterms of ON-Set: {0000, 0001, 0011, 0101, 0110, 0111, 1000, 1010, 1110, 1111}

Col 1	Col 2	Col 3
√0000	000-	
	-000	
√0001		
√1000		
	00-1 √	
√0011	0-01 √	0--1
√0101	10-0	
√0110		
√1010	0-11 √	
	01-1 √	
√0111	011- √	-11-
√1110	-110 √	
	1-10	
√1111	-111 √	
	111- √	

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