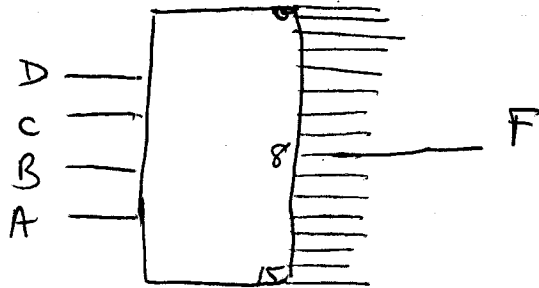


ECE 2030 Homework 4 solutions

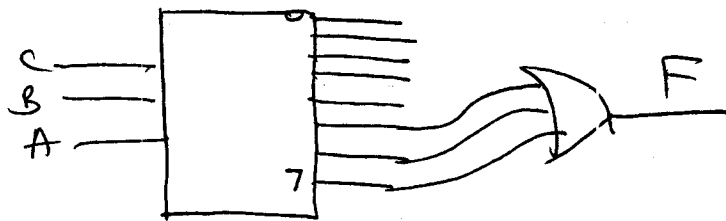
$$1. a) F = (\overline{A} \overline{B} \overline{C} + D)A = (\overline{A} + \overline{B}) \overline{C} \overline{D} A$$

$$= A \overline{B} \overline{C} \overline{D}$$

1 0 0 0 = 8



$$b) F = A \overline{B} C + A B = A \overline{B} C + A B C + A B \overline{C} = \Sigma m(5, 6, 7)$$



$$c) F = (A+B)(A+\overline{B}+C+D)(\overline{A}+\overline{D})$$

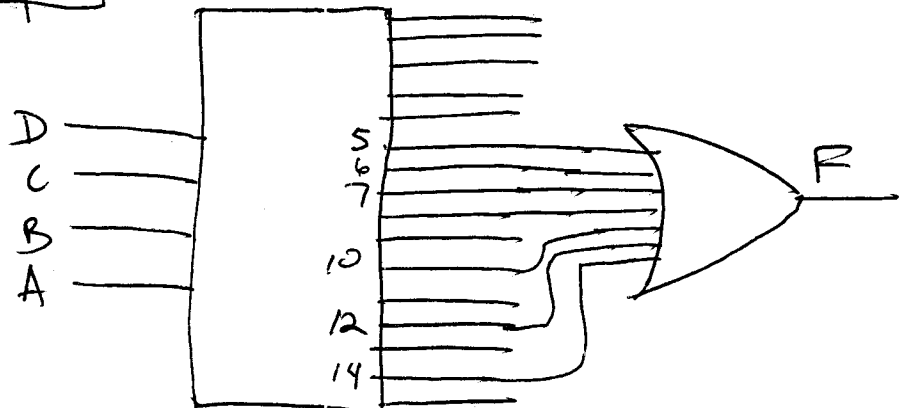
→ easiest to use POS K-map

CD		00	01	11	10
AB	00	0	0	0	0
	01	0	1	1	1
	10	1	0	0	1
	11	1	0	0	1

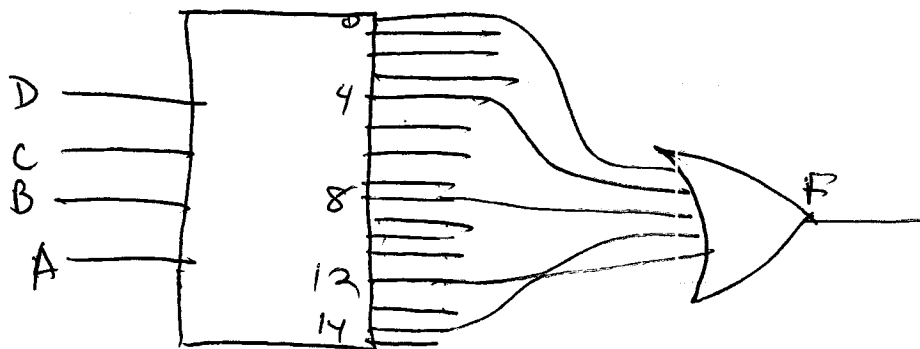
$$F = A \overline{D} + \overline{A} B D + \overline{A} B C$$

1xx0 01x1 01xx
(not unique)

$$= \Sigma m(5, 6, 7, 8, 10, 12, 14)$$



1 d) $F = \sum m(0, 4, 8, 12, 14)$



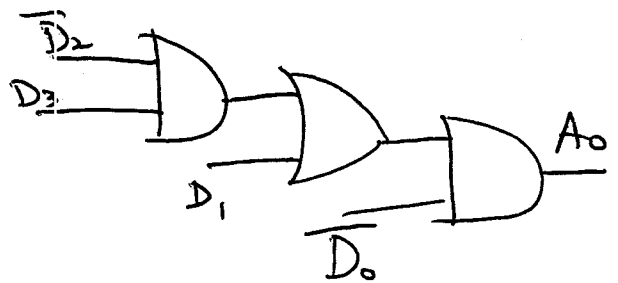
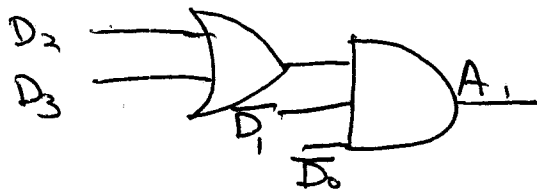
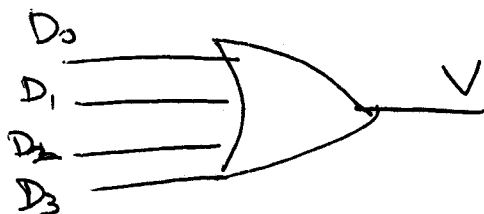
2 $D_0 > D_1 > D_2 > D_3$

D_3	D_2	D_1	D_0	A_1	A_0	V
0	0	0	0	X	X	0
X	X	X	1	0	0	1
X	X	1	0	0	1	1
X	1	0	0	1	0	1
1	0	0	0	1	1	1

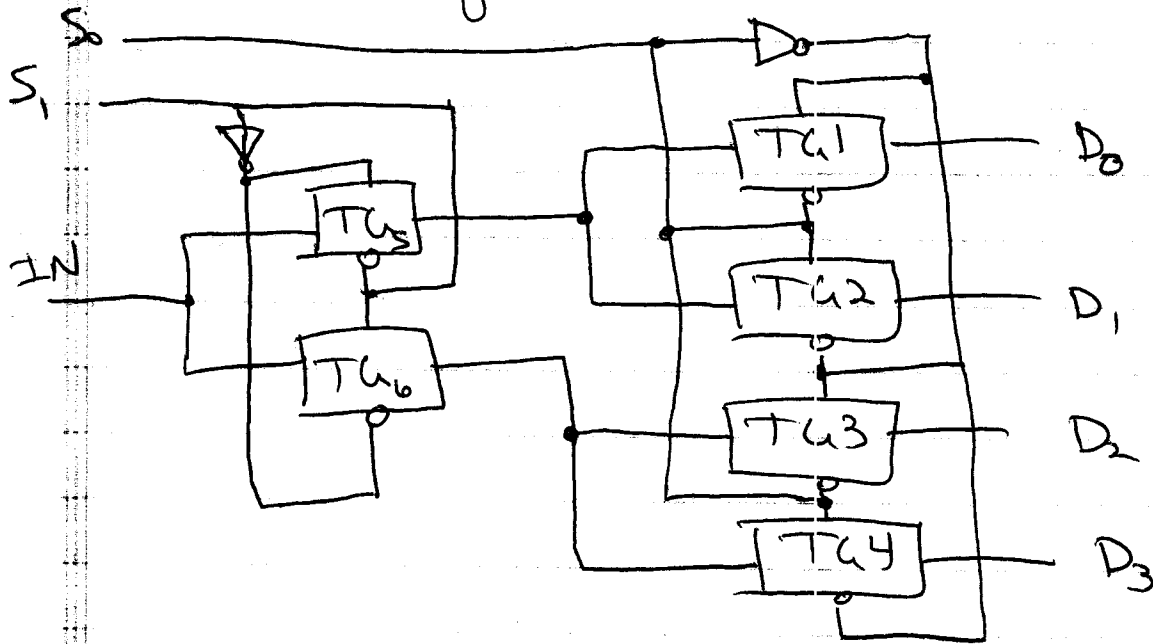
$$V = D_0 + D_1 + D_2 + D_3$$

$$A_1 = D_2 \bar{D}_1 \bar{D}_0 + \bar{D}_2 \bar{D}_1 \bar{D}_0 D_3 = \bar{D}_1 \bar{D}_0 (D_2 + D_3)$$

$$A_0 = D_1 \bar{D}_0 + D_3 \bar{D}_2 \bar{D}_1 \bar{D}_0 = \bar{D}_0 (D_1 + \bar{D}_2 D_3)$$

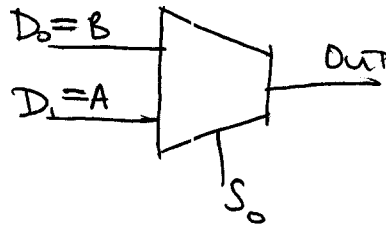


3. 1 to 4 demux is the same implementation as the 4 to 1 mux, but the outputs and inputs are reversed. (A TC is reversible in terms of I/O)



4

A	B	S_0	OUT
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1



OUT follows B when $S_0 = 0$
and it follows A when
 $S_0 = 1$

5

$$\begin{array}{r} 01110 \\ + 0110 \\ \hline 00100 \end{array}$$

no error

$$\begin{array}{r} 10110 \\ + 10010 \\ \hline 01000 \end{array}$$

error

$$\begin{array}{r} 01101 \\ + 00111 \\ \hline 10100 \end{array}$$

error

$$\begin{array}{r} 11101 \\ + 11111 \\ \hline 11100 \end{array}$$

no error