Santa Clara University

Department of Electrical and Computer Engineering

No. _____ Doren Liu _____ **Submitted on:** 10/15/20

Name *(please print)*

- **Include this page with Homework**
- **Write Name and Page Number on each page**

ELEN 153 **Problem Set #3** **Due: 10-15-2020, Thursday, 12:00 pm**
Fall 2020

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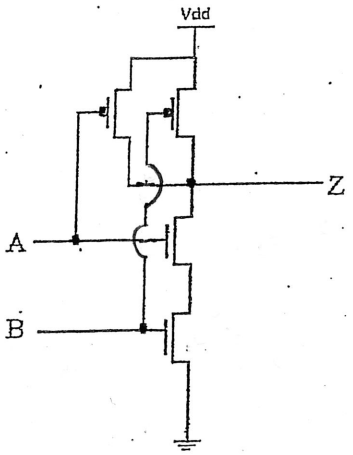
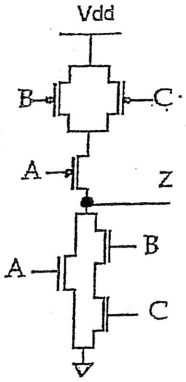
1. a) Express output(s) as logical functions of input variables for the circuits in Figs. 1-7.
   b) Draw CMOS PDN and PUN circuits to implement the logic diagrams in Figs. 8-11.



1 (3)



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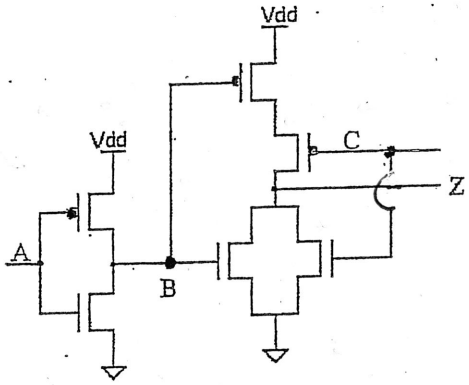
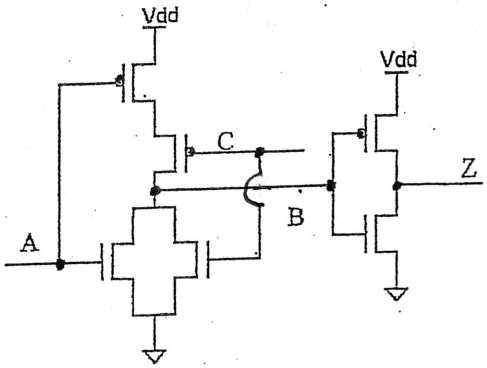
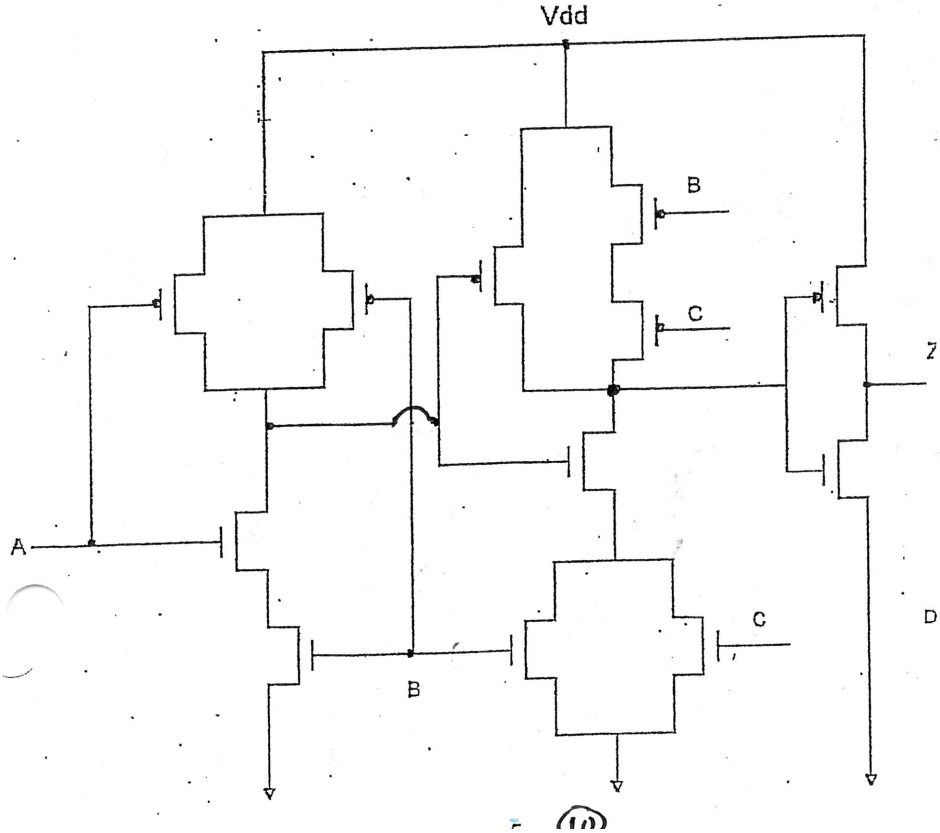


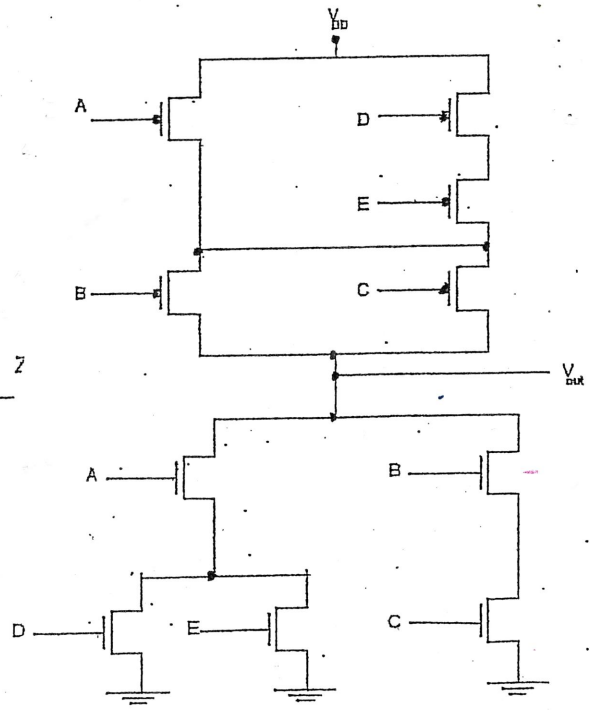
3 (8)



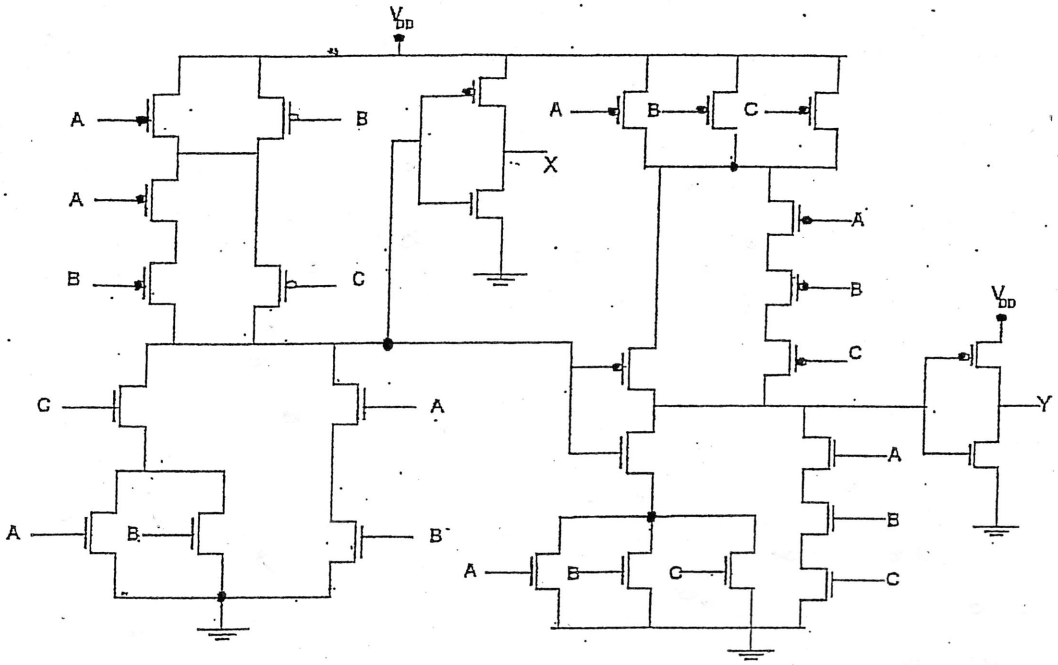
4 (8)



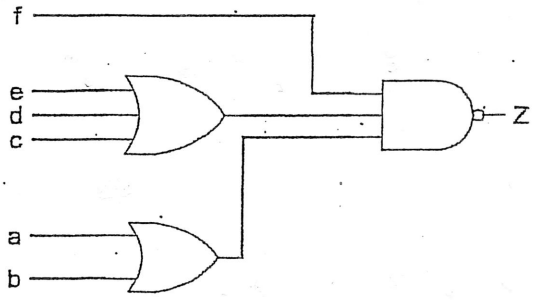
5 (10)



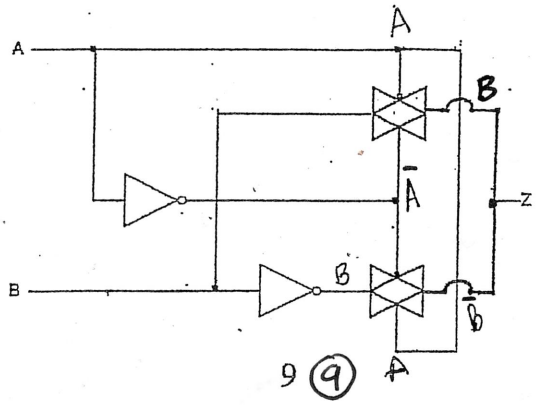
6 (10)



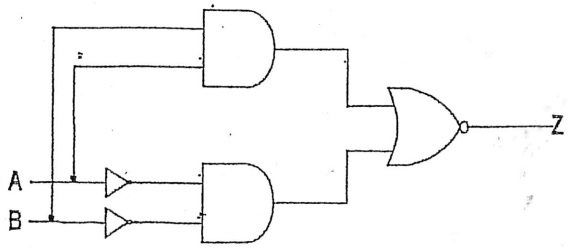
7 (15)



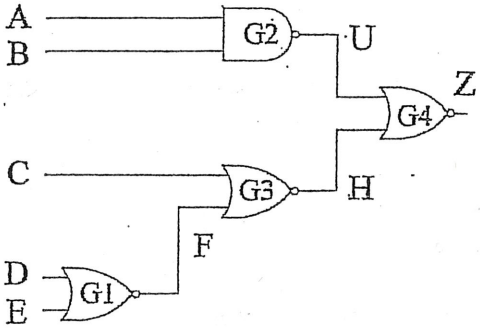
8 (9)



9 (9)



10 (9)

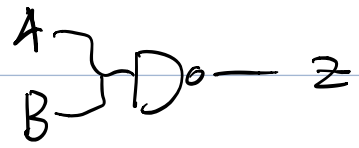


11 (14)

1)

$Z = (\overline{A \cdot B}) + (\overline{A \cdot B})$

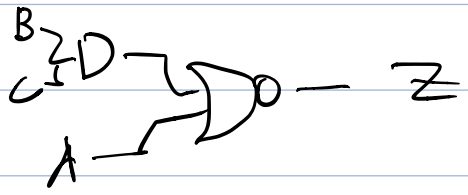
$= (\overline{A \cdot B})$



A	B	Z
0	0	1
0	1	1
1	0	1
1	1	0

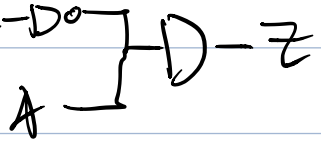
2) $\overline{(\overline{(B \cdot C)} + A)} + \overline{(A + \overline{(B \cdot C)})}$

$= \overline{A + (B \cdot C)}$



3) $\overline{(B+C)} + \overline{(B+C)}$ $\quad \overline{A} = B$

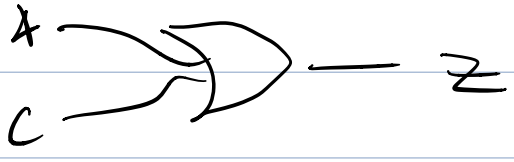
$\overline{BC} + \overline{BC} = \overline{BC} = A\overline{C}$



4) $\overline{\overline{(A+C)} + \overline{(A+C)}} = \overline{A+C}$

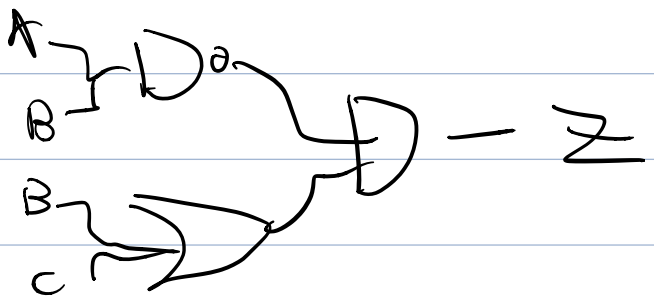
$B = \overline{A+C}$ $\quad \overline{B} = A+C$

$Z = A+C$



5) $(\overline{A \cdot B}) + (\overline{A \cdot B}) = \overline{AB}$

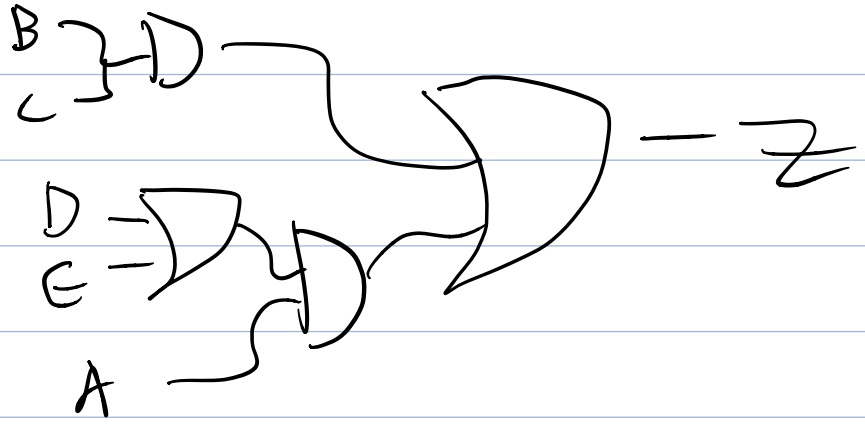
$\overline{\overline{(B+C) \cdot (\overline{AB})}} = (B+C) \cdot (\overline{AB})$



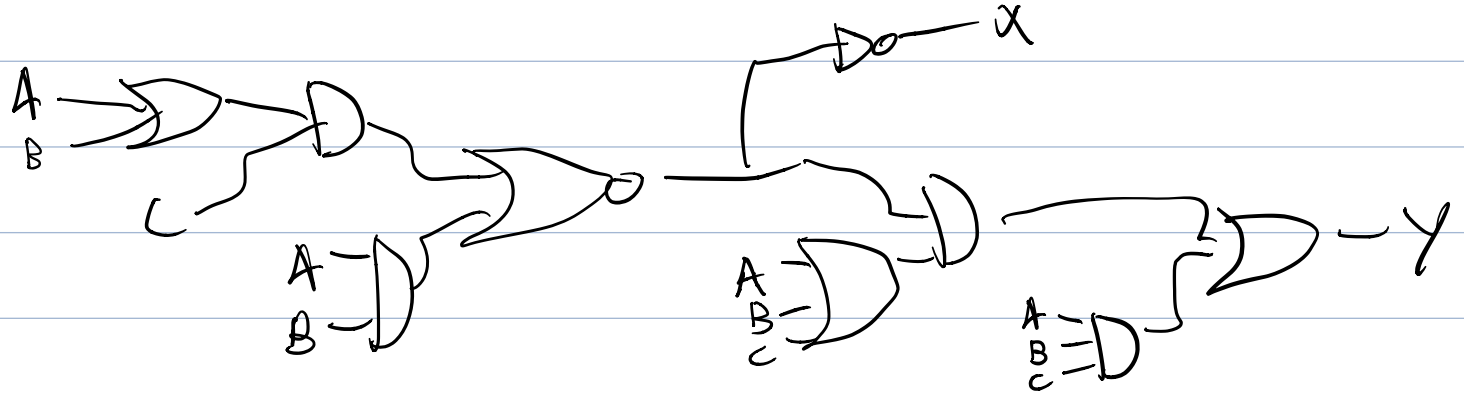
6) $\overline{\overline{(A+B)} + (D+E+\overline{(A+B)}+C)}$

$\left(\overline{(\overline{AD}) + (\overline{AE})} + BC\right)$

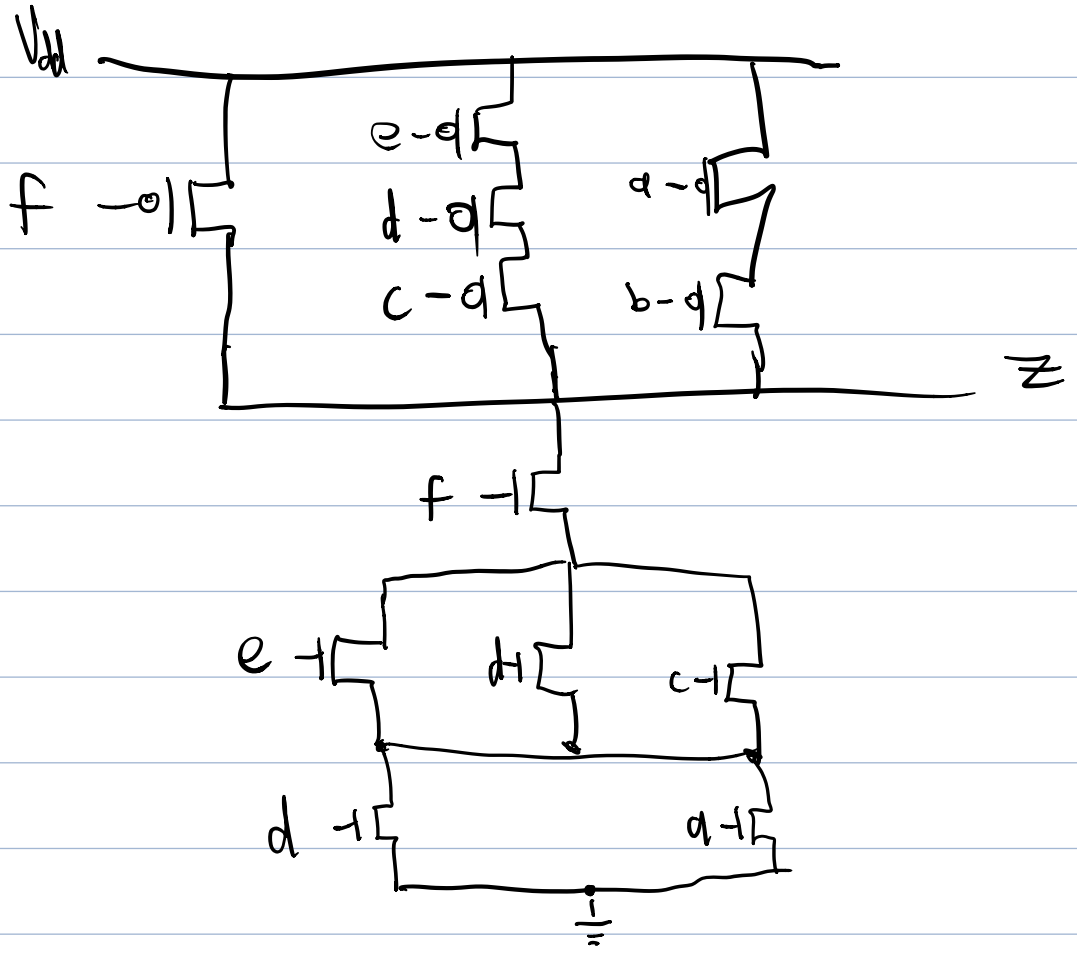
$= \overline{(BC + A(D+E))}$



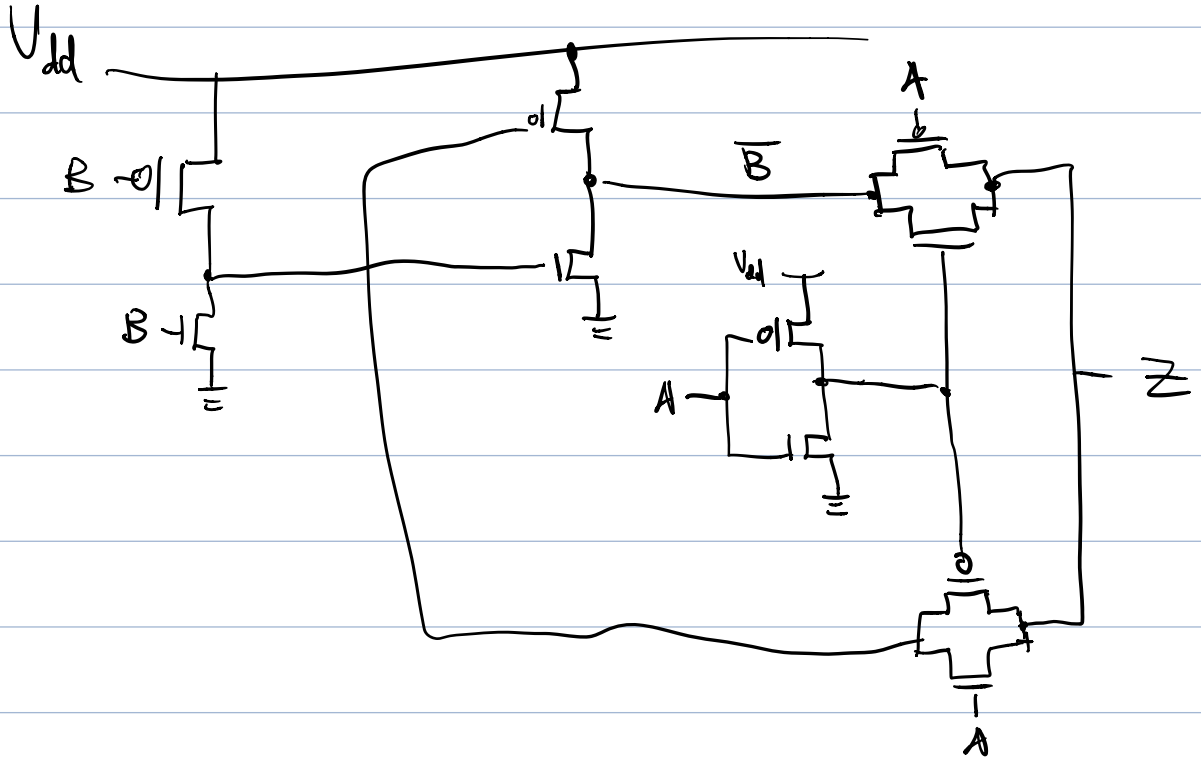
7) $X = (A+B)(C) + AB$ $\quad Y = \overline{X}(A+B+C) + XABC$



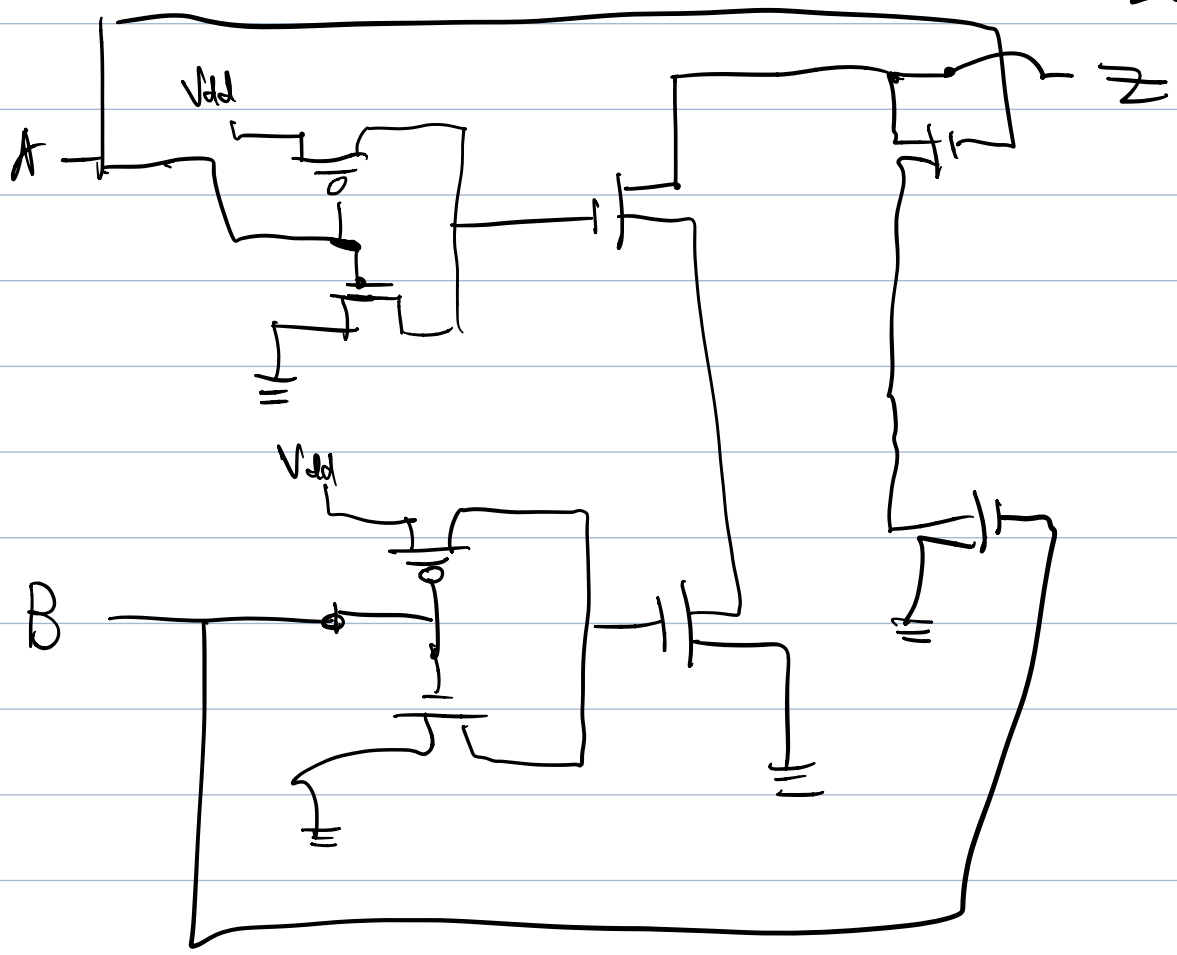
8)



9)



10)



11)