

Homework 6

Problem 1:

Implement:

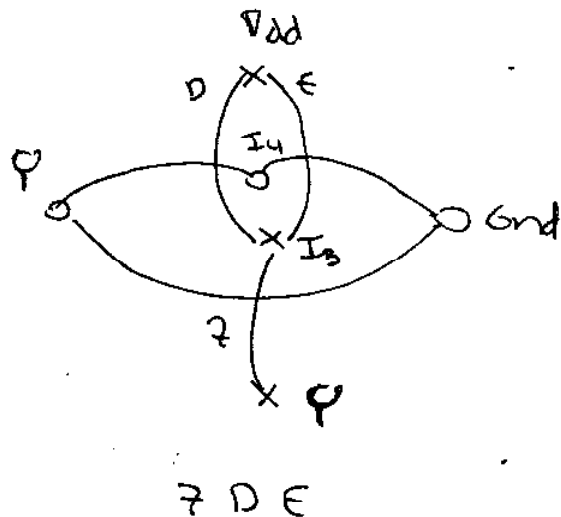
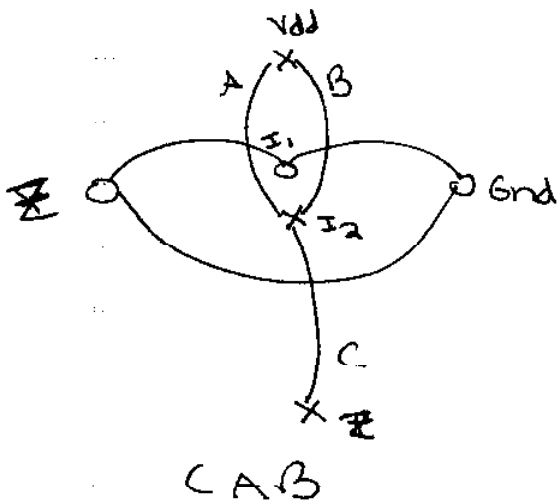
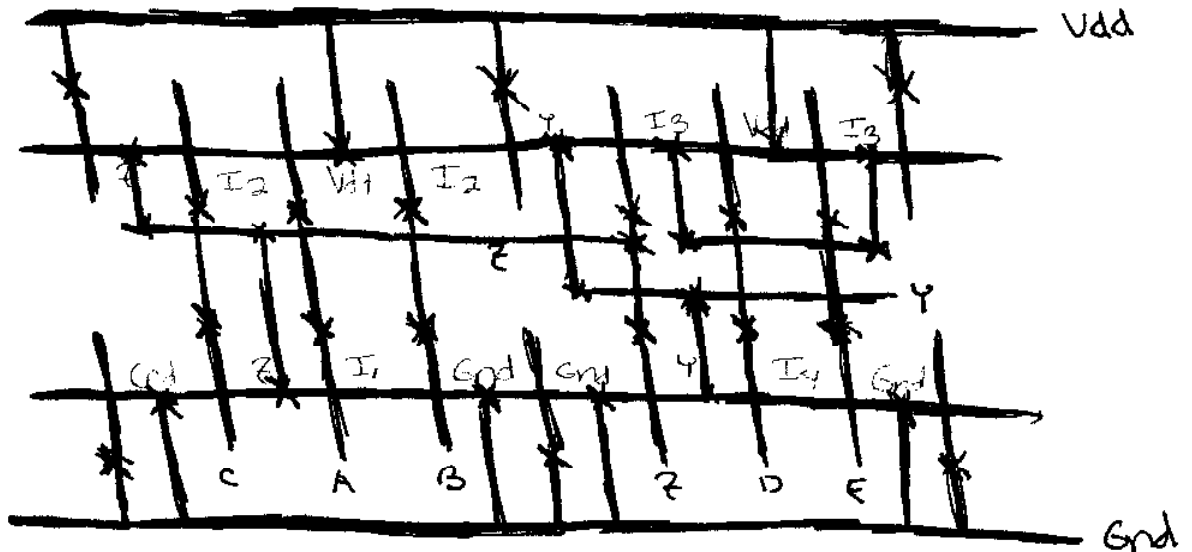
$$Z = \overline{A(B+C)} = (\bar{A} + \bar{B})\bar{C}$$

$$Y = \overline{Z + OE} = \bar{Z} \cdot (\bar{O} + \bar{E})$$

Z: pull-up: $(\bar{A} + \bar{B})\bar{C}$
 pull-down: $AB + C$

Y: pull-up: $\bar{Z} \cdot (\bar{O} + \bar{E})$
 pull-down: $Z + OE$

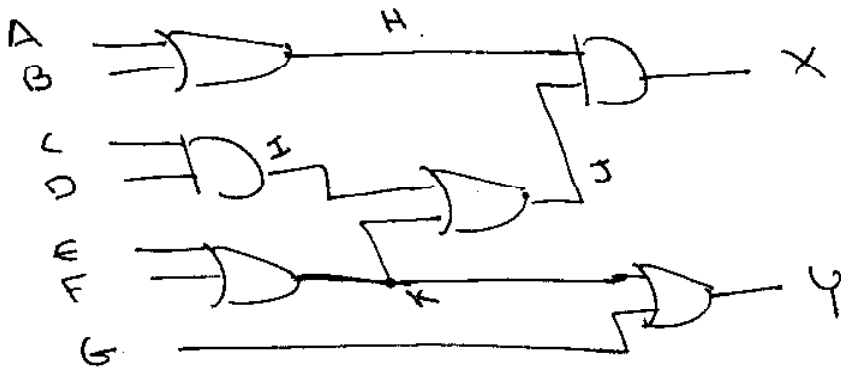
is in a gate array:



Problem 2

b Find observability, first must find controllability:

into AND gates, want $CC1$
 into OR gates, want $CC0$



$$CC1(H) = \min(CC1(A), CC1(B)) + 1 = 2$$

$$CC0(I) = \min(CC0(C), CC0(D)) + 1 = 2$$

$$CC0(K) = CC0(E) + CC0(F) + 1 = 3$$

$$CC1(I) = CC1(C) + CC1(D) + 1 = 3$$

$$CC1(K) = \min(CC1(E), CC1(F)) + 1 = 2$$

$$CC1(J) = \min(CC1(I), CC1(K)) + 1 = 3$$

observabilities of internal nodes:

$$CO(H) = CC1(J) + CO(X) + 1 = 3 + 0 + 1 = 4$$

$$CO(J) = CC1(H) + CO(X) + 1 = 2 + 0 + 1 = 3$$

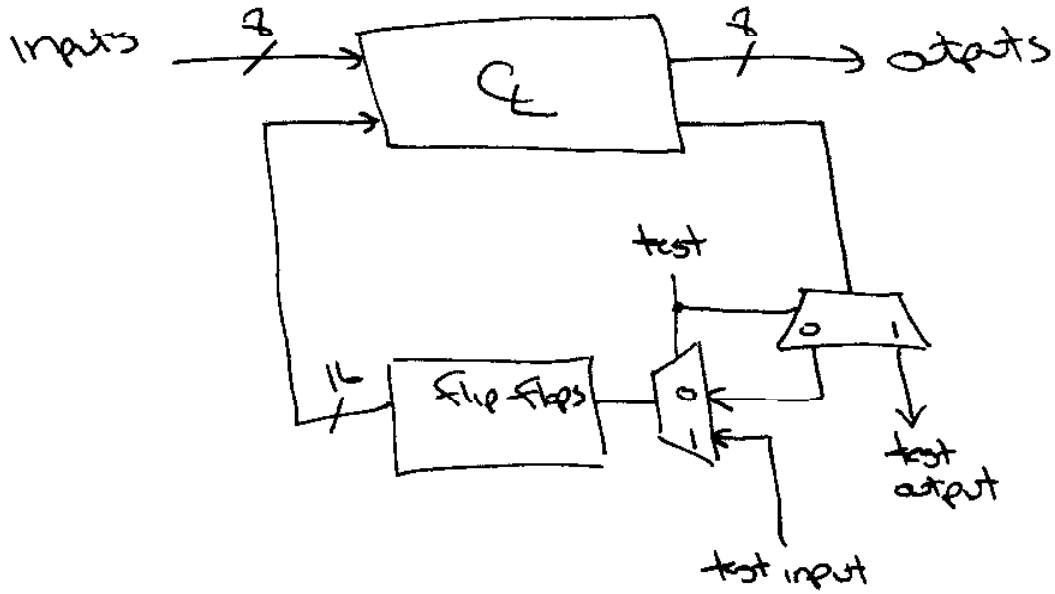
$$CO(I) = CC0(K) + CO(J) + 1 = 3 + 3 + 1 = 7$$

$$CO(K) = CC0(I) + CO(J) + 1 = 2 + 3 + 1 = 6$$

$$CO(G) + CO(Y) + 1 = 1 + 0 + 1 = 2 \quad * \text{ better answer}$$



Problem 3



or, if you have more room:

