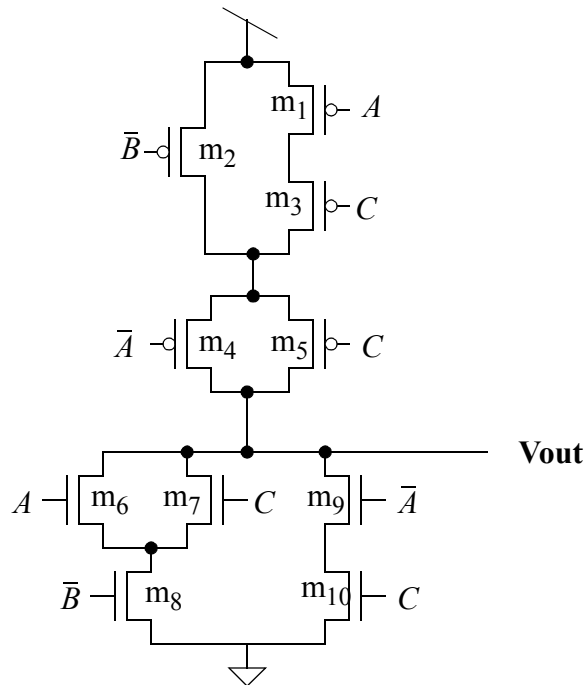


Homework 4

Problem 1

Find the functionality for the following circuit. Complete a truth table (please include which FETs are on or off), then write the final function in sum-of-products format. (if you cannot figure out the function by looking at the circuit, place the truth table in a K-Map. Simplify the K-Map to find the resulting sum-of-products function.)



Problem 2

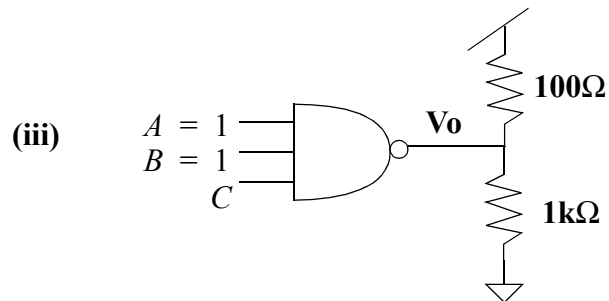
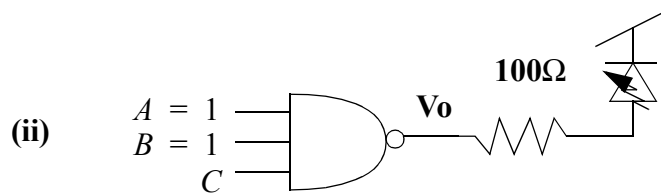
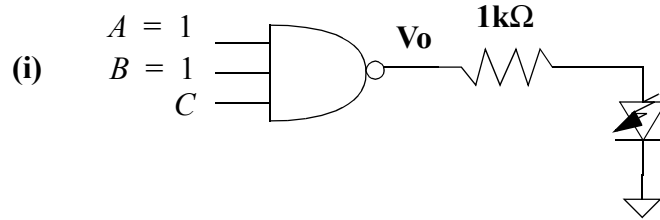
Develop the CMOS circuit for the following function. Do not simplify the function. Implement it in its current form. Make sure that your circuit does not produce a short between VDD and GND or a floating output.

$$X = \overline{(A + B)CD + AB}$$

Problem 3

The DC characteristic of a 3-input NAND can be found by assuming that A=B=Vdd and C moves from 0V to Vdd. Vdd=5V for this problem.

(a) Find V_{OH} (the output voltage for a high) and V_{OL} (the output voltage for a low) for the following three loads assuming that $R_{ds}=10\Omega$.



(b) Draw the resulting DC characteristic for each of the 3 loads. Be sure to notate the V_{OH} and V_{OL} levels precisely.