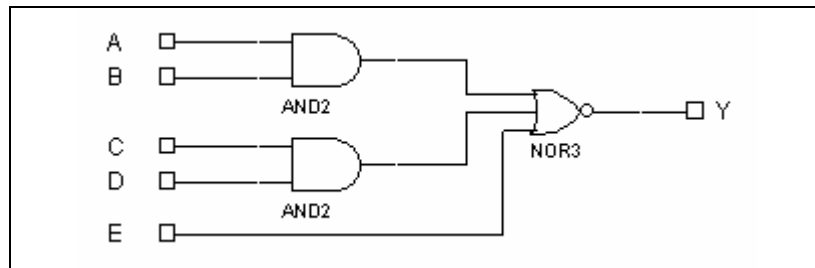


ECE 370: Digital Systems-Logic Design

Sample Test: Chapter 3

Spring 2005

1. What is the complex gate CMOS circuit for a 2-input NAND gate? A 3-input NAND gate?
2. What is the complex gate CMOS circuit for a 2-input NOR gate? A 3-input NOR gate?
3. What is the complex gate CMOS circuit for a 2-input AND gate? A 3-input AND gate?
4. Based on your results for Problems 1-3, why does it make more sense to implement complex digital circuits with nothing but NAND and NOR gates?
6. For the circuit below, what is the CMOS complex circuit using the PUN and PDN design principles? Counting inverters, how many MOSFET transistors are needed?



7. Given the Boolean equation below, what is the complex CMOS circuit that implements $y(A,B,C)$? How many MOSFET transistors are needed to implement $y(A,B,C)$? (*Hint: Try Boolean algebra first!*)

$$y(A, B, C) = (B + \bar{C})(\bar{B} + C)(A + B + C) + \bar{A}(\bar{B} + C)$$

8. Given the following PDN for a complex circuit, what is the PUN? What is the logic equation for this function? What is the truth table for the function? Can it be simplified? If so, simplify it using Boolean algebra. How many MOSFET transistors are needed to implement the whole circuit, including inverter?

