

CDA Computer Logic Design

Homework 2

Points: 100

Questions 1 to 6: 15 points each

Question 7: 10 points

1. Draw the schematic for the following functions using NOR gates only:
 - a. $\overline{(x+y)} + \overline{z}$
 - b. $xy + xz$
2. Draw the schematic for the following function using NAND gate only:
 - a. $\overline{(x+y)} + \overline{z}$
 - b. $xy + \overline{x}\overline{y}$
3. Determine the minimized realization of the following functions in the sum-of-products form:
 - a. $f(a,b,c,d) = \sum m(1,7,11,13) + \sum d(2,5,14,15)$
 - b. $f(a,b,c,d) = \prod M(1,2,11,13,14,15) + \sum d(6,7,10)$
4. Exercise: 2.4
5. Derive the Boolean expressions for 2-bit multiplier. Each output bit should be represented by a different Boolean expression.
6. Design a circuit of 5 input variables that generates output 1 if and only if the number of 1's in the input is prime (i.e., 2, 3 or 5).
7. Please use the Quine-McCluskey algorithm to find all of the prime implicants of the function $F(A, B, C, D) = \Sigma m(0, 2, 5, 6, 7, 8, 10, 12, 13, 14, 15)$