

EE 231 – Homework 4
Due September 24, 2010

1. Find all the prime implicants for the following Boolean functions, and determine which are essential. Then simplify the expressions.
 - (a) $F(w, x, y, z) = \Sigma(0, 1, 4, 5, 6, 7, 8, 9, 13, 15)$
 - (b) $F(A, B, C, D) = \Sigma(0, 1, 2, 3, 6, 7, 8, 9, 13, 15)$
 - (c) $F(A, B, C, D) = \Sigma(0, 2, 3, 4, 6, 7, 9, 11, 13, 15)$
2. Find the minterms of the following Boolean expressions by first plotting each function in a map:
 - (a) $x'z' + y'z' + z'yz'$
 - (b) $A'B + BC'D' + AC'D' + A'CD$
 - (c) $w'xy' + yz + xy'z'$
3. Simplify the following Boolean function using five-variable maps:
 $F(A, B, C, D, E) = \Sigma(4, 5, 6, 7, 8, 9, 10, 11, 14, 19, 20, 21, 22, 23, 27, 30, 31)$
4. Simplify the following Boolean function to product-of-sums form:
 - (a) $F(w, x, y, z) = \Sigma(0, 1, 4, 5, 6, 13)$
 - (b) $F(w, x, y, z) = \Pi(0, 2, 3, 5, 7, 8, 10, 11, 13, 15)$
5. Simplify the following Boolean function F , together with the don't-care conditions d .
 - (a) $F(w, x, y, z) = \Sigma(0, 1, 2, 3, 4, 6, 12)$
 $d(w, x, y, z) = \Sigma(5, 10, 11, 13)$
 - (b) $F(w, x, y, z) = \Sigma(4, 12, 13)$
 $d(w, x, y, z) = \Sigma(0, 1, 2, 6, 7, 9)$
6. Problem 3.28
7. Write a Verilog gate-level description of the circuit shown in
 - (a) Fig. 4.2 (p. 124)
 - (b) Fig. 4.4 (p. 129)
8. Using continuous assignment statements, write a Verilog description of the circuit shown in
 - (a) Fig. 4.2 (p. 124)
 - (b) Fig. 4.4 (p. 129)