

HW3

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1. (10%) Simplify the following Boolean functions or expression, using three-variable maps:
 - (a) $F(x, y, z) = \Sigma(1, 3, 4, 5, 6)$
 - (b) $F(x, y, z) = x'y + xy'z + yz'$
 2. (20%) Simplify the following Boolean functions by first finding the essential prime implicants (Please indicate the essential prime implicants and prime implicants):
 - (a) $F(w, x, y, z) = \Sigma(0, 1, 2, 4, 5, 6, 8, 10, 13, 15)$
 - (b) $F(w, x, y, z) = wy' + xy + y'z + w'xz$
 3. (10%) Simplify the following expressions in (a) sum of products and (b) product of sums:

$$F(x, y, z) = xy' + y'z + xz + xyz'$$

4. (20%) Simplify the following Boolean function F, together with the don't-care conditions d, and then express the simplified function in sum of products:
 - (a) $F(x, y, z) = \Sigma(0, 1, 2, 4)$, $D(x, y, z) = \Sigma(3, 6, 7)$
 - (b) $F(A, B, C, D) = \Sigma(1, 3, 5, 7, 9, 15)$, $D(A, B, C, D) = \Sigma(4, 10, 11, 12)$
5. (10%) Simplify the following expression, and implement it with two-level NAND gates:

$$F(A, B, C) = (A + B' + C')(A + B')(B' + C)$$

6. (10%) Simplify the following expression, and implement it with two-level NOR gates:

$$F(w, x, y, z) = w'z + xy' + yz + wx'y$$

7. (20%) Simplify the following Boolean function F, using the two-level forms (a) AND-OR-Inverter, (b) OR-AND-Inverter logic diagrams

$$F(x, y, z) = \Sigma(0, 1, 2, 4, 5, 6)$$