Cpr E 281 RC-MINI
WEEK 7
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

Recitation Material for Week 7
Tasks to do in the recitation section
Assigned Date: Sixth Week

T1. Review HW05 problems and solve any problems that the students point out they had difficulties with.

T2. Answer any general questions about HW06 and the Mini Project.

T3. Solve the following problems.

1. Consider the function f(a,b,c,d) = ∑ m(4,7,8,11) + D(12,15).

    a. Use K-map to find a minimum-cost SOP realization for f. What is the cost of this expression?

    b. Implement f using two 2-input OR gates and two 3-input AND gates. What is the cost of this implementation? *Hint:* You may need to consider a multilevel implementation of the expression in part (a).

2. Suppose you want to uniquely represent 24 objects using a binary number. What is the minimum number of bits that you need? What if you have n objects?

3. Perform the following conversions:
    a. $(1010101)_2$ to decimal
    b. $(139)_{10}$ to binary
    c. $(0101101110)_2$ to hexadecimal
    d. $(ABC)_{16}$ to binary
    e. $(FE45)_{16}$ to octal
    f. $(1234)_5$ to base 6 representation
    g. -25 in decimal to 6-bit sign-and-magnitude
    h. -25 in decimal to 6-bit 1's complement
    i. -25 in decimal to 6-bit 2's complement
    j. $(10110)_2$ in 5-bit sign-and-magnitude to 5-bit 1's complement
    k. $(10110)_2$ in 5-bit sign-and-magnitude to 5-bit 2's complement
    l. $(11101)_2$ in 5-bit 1's complement to 5-bit sign-and-magnitude
    m. $(11101)_2$ in 5-bit 1's complement to 5-bit 2's complement
    n. $(101110)_2$ in 6-bit 2's complement to 6-bit sign-and-magnitude
    o. $(101110)_2$ in 6-bit 2's complement to 6-bit 1's complement
    p. (010101)2 in 6-bit sign-and-magnitude to 6-bit 2’s complement

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4. Negate the following 6-bit 2's complement binary numbers:
   a. 001010
   b. 110011
   c. 010101
   d. 111000

5. What should the base b be such that x=3 is a root of the equation
   $6_b x^2 - 55_b x + 105_b = 0$?

6. Perform the addition of the numbers listed in each column and determine if overflow occurs. All numbers are 6-bit and stored in 2's complement.

011101	000101	111101	111110
001000	101010	001111	111001