# Cpr E 281 RC05 WEEK 6
ELECTRICAL AND COMPUTER ENGINEERING
IOWA STATE UNIVERSITY

# Recitation Material for Week 6
## Tasks to do in the recitation section
## Assigned Date: Fifth Week

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

T2. Answer any general questions about Mid-term #1 and Lab 05 that students ask.

T3. Solve the following problems in order until time runs out.

1.  Consider a multiplexer function Mux (X, Y, Z) = X'Y + XZ where X is the selection signal. Show that Mux (X, Y, Z) = X'Y + XZ + YZ is equivalent to the original equation using **Boolean algebra** rules. Intuitively explain why YZ term is redundant.

2.  In the following expression, uses the equivalence of Part 1 (above) to identify groups of three product terms such that each group can be reduced into two product terms. Please write down the simplified expression.
    Z = PQ + RS + PR' + PS + Q'S + Q'R'

3.  Draw a K-map for the original expression Z in Part 2 (above). Then derive the simplest SOP expression.

4.  Derive the min-cost implementation using a K-map for the function F below.

| P Q R S | F |
|---------|---|
| 0 0 0 0 | 1 |
| 0 0 0 1 | 1 |
| 0 0 1 0 | D |
| 0 0 1 1 | 1 |
| 0 1 0 0 | 0 |
| 0 1 0 1 | 0 |
| 0 1 1 0 | 0 |
| 0 1 1 1 | D |
| 1 0 0 0 | 1 |
| 1 0 0 1 | 1 |
| 1 0 1 0 | 0 |
| 1 0 1 1 | 1 |
| 1 1 0 0 | 1 |
| 1 1 0 1 | 1 |
| 1 1 1 0 | 0 |
| 1 1 1 1 | 1 |

5.  Demonstrate programming the functions Z in Part 2 and F in Part 4 above in a PLA. Please use as few AND gates as possible.