Important Remarks

- Homework is due on Nov. 15th, 2011 at the beginning of class

(**Make sure you sketch the equivalent circuit**).

1. Convert the following binary numbers to decimal
   (a) 11001011
   (b) 1011.101
2. Convert the following binary numbers to hexadecimal
   (a) 10111101
   (b) 1010110
3. From the following given truth table

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

   (a) Write a Boolean equation for the output F in terms of A, B and C.
   (b) Draw a simple logic diagram for your equation from part (a) using 2-input AND and OR gates, and inverters.
   (c) Use Karnaugh maps to reduce the original equation.
4. For the following logic function construct a truth table for the expression, draw a Karnaugh map from the table, and derive a reduced equation.

$$F = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B} \tag{1}$$

5. A rocket ship is preparing to launch. The system which enables the launch has three status levels, Red, Yellow, and Green. The system has four inputs
   A: Mission control ready switch (1=ready, 0=not ready)
   B: Pilot Ok indicator (1=pilot ok, 0=pilot not ok)
   C: Launch pad motion detector (1=motion detected, 0=no motion detected)
   D: Engine ignition detector (1=engines ignited, 0=engines dead)

   The ship is clear for takeoff if all of the following conditions are met: Mission control is ready, the pilot is OK, there is no motion on the launch pad, engines are ignited. Launch status should be red if two or less of the above conditions are met. Status is yellow if exactly three of the conditions are met. Green status comes only when the rocket is clear for take off.

Represent each status level with a fully reduced logic function. Hint: You can think of this as three separate problems - one for each status level. For each level, create a truth table, reduce with a K-map and derive the reduced function from the K-map. You should end up with three functions in the end, such as F_{red}, F_{yellow}, and F_{green}.