Spring 2007   ECE 224B   Homework #1

Due: 4/11/07 (Wed.) in class; no late homework will be accepted

Problem #1
Derive the Boolean logic functions for (i) conversion from straight binary code to Gray code and (ii) from Gray code to straight binary. Be sure to specific the expressions for the MSB, LSB, and the intermediate bits.

Problem #2
For a full scale voltage of 1 V, what is the resolution of an ADC that would yield a LSB equivalent to the thermal noise associated with a 1 kΩ resistor over a signal bandwidth (B) of 1 MHz at 27 degree C? The thermal noise power of a resistor R is 4 kTRB, where k is the Boltzmann's constant and is equal to 1.38e-23 J/K.

Problem #3
Based on the datasheet and evaluation board user guide for the National Semiconductor DAC121S101 and the WaveVision data capture system user guide, list (i) the test bench equipment that you will need to valid the static and ac specifications of the converter (e.g. (power supplies, oscilloscope, etc), (ii) the requirement for each of the equipment, and (iii) a list of the DAC specifications you will able to test with these equipment.