EE467/567 "Advanced Microprocessors"

Assignment #2

Due: *In-class Monday January 30 2012*

1. Convert the following numbers to fixed-point (8-bits before and 8 bits after the binary point) and determine the round-off error
   a) +26.2650625
   b) -9.7439053

2. Convert the following numbers to floating-point numbers.
   c) +26.2650625
   d) -9.7439053

3. Write the lines of assembly code that implement the following equation in fixed-point arithmetic and floating-point arithmetic:

   Z = (A1*X - A2)/Y

   Note 1: Floating point: A1, X, A2, and Y are double-precision floating point numbers
   Note 2: Fixed point: A1, X, and Y are 8-bit unsigned integers; A2 is a 16-bit unsigned word.

4. Random number generators are frequently used in engineering simulations. Random numbers generated by a computer are in general not truly random but pseudo-random; they are generated by some kind of mathematical model. In this problem we want to generate random numbers based on the following mathematical model:

   R2 = ((R1*X) + 1)

   where R1 is the seed value or previous value of R2, R2 is the next random number, and X is a constant. X is an unsigned word (fixed point) stored at memory location 1A001 and R1 is an unsigned word (fixed point) stored at memory location 1A004. Furthermore, after calculation of R2, R1 must be overwritten by the low-word of R2. Make sure to setup the segment registers correctly (assume real-mode or 8086).

5. Write is program that implements the following mathematical function:

   R6 = (R1 + R2 + R3 + R4)/R5;

   a) In fixed-point arithmetic where R1 through R4 are the memory locations of signed words and R5 and R6 are the memory locations of signed bytes.

   b) In floating point arithmetic where R1 through R6 are the memory locations of 32-bit floating-point numbers.