Computer Organization and Structure

Homework #4
Due: 2007/12/11

1. Convert 4096_{ten}, $-2{,}047_{ten}$, and $-2{,}000{,}000_{ten}$ into 32-bit two's complement binary numbers, respectively, and convert the following two's complement binary numbers to be decimal numbers:

   a. 1111 1111 1111 1111 1111 1111 0000 0110_{two};
   b. 1111 1111 1111 1111 1111 1111 1110 1111_{two};
   c. 0111 1111 1111 1111 1111 1111 1110 1111_{two}.

2. Suppose that all of the conditional branch instructions except `beq` and `bne` were removed from the MIPS instruction set along with `slt` and all of its variants (`slti`, `sltu`, `sltui`). Show how to perform

   ```
   slt       $t0, $s0, $s1
   ```

   using the modified instruction set in which `slt` is not available. (Hint: It requires more than two instructions.)

3. Show the IEEE 754 binary representation for the floating-point numbers 10_{ten}, 10.5_{ten}, 0.1_{ten}, and -2/3, respectively.

4. With x = 0000 0000 0000 0000 0000 0000 0101 1011_{two} and y = 0000 0000 0000 0000 0000 0000 0000 1101_{two} representing two's complement signed integers, perform, showing all work:

   a. x+y
   b. x-y
   c. x*y
   d. x/y