EE 3755, Spring 2005

Homework #1

Due Friday, February 25

in class
HW #1

Please do the following problems:

1. Perform the addition $X + Y$ where $X$ and $Y$ are the following 6-bit sign magnitude numbers:
   
   $X = (011100)_2 = (+28)_{10}$, $Y = (111110)_2 = (-30)_{10}$.

2. Using the Booth algorithm that relies on examining three bits at a time, perform the signed multiplication with multiplier $(-27)_{10}$, multiplicand $= (-22)_{10}$, and length $n = 6$.

3. Using the shift-subtract/add division algorithm, perform the division of the 10-bit dividend $A = (0000001101)_2$ by the 5-bit divisor $B = (00101)_2$.

4. Using the shift-subtract/add division algorithm, perform the division of the 10-bit dividend $A = (0000010001)_2$ by the 5-bit divisor $B = (00011)_2$. 
5. Compute the Dynamic Range for a floating point system based on the 40-bit binary FLP format shown below:

\[
\begin{array}{c}
\begin{array}{c}
\text{Sign bit} \\
\text{10-bit signed exponent} \\
\text{(2's complement system used)} \\
\text{29-bit unsigned normalized fraction}
\end{array}
\end{array}
\]

6. Consider the following two floating point numbers with 4-bit exponents in biased form and 8-bit unsigned normalized fractions:

\[
A_1: s_1 \text{ } e_1 \text{ } f_1 \\
A_2: s_2 \text{ } e_2 \text{ } f_2
\]

\[
A_1: 0 \text{ } 1011 \text{ } 1110000 \\
A_2: 1 \text{ } 1001 \text{ } 10010010
\]

Compute the summation \( A_3 = A_1 + A_2 \), return the result \( A_3 \) in a form consisting of a normalized fraction and exponent in biased form.
Problem 7

Refer to the handout #8 (the Carry Lookahead Adder). Refer to Figure 2 on page 9.
Now answer the following questions:
(a) Write the equation by which the appropriate BCLA unit computes \( g_5 \).
(b) Write the equation by which the appropriate BCLA unit computes \( p_6 \).
(c) Write the equation by which the 8-bit CLA unit computes \( c_{23} \).
(d) Write the equation by which the appropriate BCLA unit computes \( c_{26} \).