The UNIVERSITY *of* NORTH CAROLINA *at* CHAPEL HILL

Comp 411 Computer Organization
Spring 2011

Problem Set #5
Issued Wednesday, 3/30/11; Due Wednesday, 4/6/11 (beginning of class)

Note: You may use additional sheets of paper, but please enter your answers in the space provided in this document.

Problem 1. "Bits of Floating-Point" (20 points)

Represent the following in *single-precision* IEEE floating point. Give your answers in *hexadecimal.* Enter the answers in the table below.

a) -205.0
b) 60.125
c) $(2^{11} - 1)$

Decimal	***S field***	***E field (binary)***	***F field (binary)***	***Complete Number (Hex)***
-205.0				
60.125				
$2^{11} - 1$				

Convert the following single-precision floating-point number (given in hexadecimal) to decimal, and enter the answer in the table below:

d) 0x338c0000

After you determine the *S, E,* and *F* fields, compute the decimal value using a calculator.

Hex	***S field***	***E field (binary)***	***Significand (binary)***	***Decimal (using calculator)***
338c0000				

Problem 2. "Floating-Point Arithmetic" (20 points)

Given the following two single-precision IEEE floating-point numbers:

x = 0x35c00000 and y = 0x33c00000

Compute the following in *binary or hexadecimal* showing all work: **x + y**

NOTE: You must strictly follow the steps of *binary* floating-point addition, as presented in class. That is, handle exponents, mantissas, alignment, etc. as discussed in class. *Do NOT simply convert these numbers into decimal and compute the answers using a calculator!* (You will receive zero credit for doing so!)

In particular, show the following steps: (i) convert the hex numbers into their *S, E,* and *F* fields; (ii) perform any alignment, if needed; (iii) perform the addition; and (iv) perform any normalization of the result, if needed. Finally, verify that your answer is correct by using a calculator to find the decimal values of *x* and *y*, and the decimal value of your computed sum.