CS 430 Problem Set #3

Date assigned: Monday, October 20, 2008.
Date due: Wednesday, October 29, 2008 @ 11:45am.
Points: 52 pts.

1. (6 pts) Represent -47 in (a) signed-magnitude, (b) 1's complement, and (c) 2's complement notation.

2. (10 pts) The "number of numbers" counts how many numbers (possible combinations) can be represented. For the IEEE 754 single-precision floating-point number, what is the "number of numbers" excluding infinity and NaN? Show a detailed solution as to how you arrived at your solution.

3. (10 pts) What is 384.0 and -745.0625 decimal in IEEE 754 single-precision floating-point format? Give your answer in HEX and show all work for full credit.

4. (6 pts) Assume a 16-bit representation of the IEEE 754 floating-point number exists with a sign bit, a 4-bit exponent, and an 11-bit mantissa (significand). Give a general formula for the largest and smallest values that can be represented using this format.

5. (10 pts) Write a complete C program that shows whether Zeus uses the IEEE 754 format or does not use this format.

6. (10 pts) Consider the expression: A + B * C / D - E * F

    a. Convert this expression from infix to postfix notation.

    b. Write program segments for a stack machine and a 1-Address machine that evaluates the above expression. In the case of the stack machine, leave the result on top of the stack. In the case of the 1-Address machine, identify where your result is. The instruction sets are listed below:

```
Stack Machine     One-address Machine
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push m            load m
pop m             store m
add               add m
sub               sub m
mul               mul m
div               div m
```

You may submit this assignment in one of two way: (1) a Google document shared with ShereenKhoja@gmail.com, (2) a Word document attached to an email sent to ShereenKhoja@gmail.com. Do not submit a hard copy. Name your document “04PSPUNet”, i.e. mine would be called “04PSkhoj0332”.

The program for question 5 must be sent to me by email via an attachment. I will only need your .c file. Name your file “04ieeePUNet.c”, i.e. mine would be called “04ieeekhoj0332.c”.