ALGONQUIN
COLLEGE

Name: _____   **Lab Section:** _____

Objectives: To practice hexadecimal math and IEEE 754 conversions.

References: ECOA2e Section 2.3, 2.4, 2.5; Class Notes
           http://teaching.idallen.com/cst8214/07f/

Show all your work clearly, either on the back of this page or on attached separate sheets. Some of the work you did on the previous lab may be copied and re-used in this lab. The answers to many of these questions are in the Class Notes.

1.   What are the largest and smallest integers a 16-bit word can hold using a sign-magnitude representation?
2.   What are the largest and smallest integers a 16-bit word can hold using a one's complement representation?
3.   What are the largest and smallest integers a 16-bit word can hold using an unsigned representation?
4.   Convert 16-bit unsigned $1A8C_{16}$ to decimal $6,796_{10}$ and compare with the two's complement conversion.
5.   Convert 16-bit unsigned $7FFF_{16}$ to decimal $32,767_{10}$ and compare with the two's complement conversion.
6.   Convert 16-bit unsigned 8000_{16} to decimal $32,768_{10}$ and compare with the two's complement conversion.
7.   Convert 16-bit unsigned $A123_{16}$ to decimal $41,251_{10}$ and compare with the two's complement conversion.
8.   Convert 16-bit unsigned $FFFF_{16}$ to decimal $65,535_{10}$ and compare with the two's complement conversion.
9.   Circle the negative numbers (16-bit unsigned): $6FFF_{16}$ $7FFF_{16}$ 8000_{16} 8001_{16} $9FC5_{16}$ $A123_{16}$ $BFFF_{16}$
10. Add 16-bit unsigned $ABCD_{16}$ to $7FFF_{16}$ and give the Result, Carry, and Overflow. Is the result correct?
11. Add 16-bit unsigned $8A9C_{16}$ to $ABCD_{16}$ and give the Result, Carry, and Overflow. Is the result correct?
12. Add 16-bit unsigned 9999_{16} to 4321_{16} and give the Result, Carry, and Overflow. Is the result correct?
13. Convert decimal 147.625 to IEEE 754 single-precision format 4313A000h
14. Convert decimal 2004 to IEEE 754 single-precision format 44FA8000h
15. Convert decimal -20.5 to IEEE 754 single-precision format C1A40000h
16. Convert decimal -0.5 to IEEE 754 single-precision format BF000000h
17. Convert decimal -1 to IEEE 754 single-precision format BF800000h
18. Convert IEEE 754 single-precision format 438F0000h to decimal 286
19. Convert IEEE 754 single-precision format BF880000h to decimal -1.0625
20. The IEEE 754 floating-point number 81234567h is negative. Without converting, give the hexadecimal for the same number, only positive.
21. The IEEE 754 floating-point number 7EDCBA98h is positive. Without converting, give the hexadecimal for the same number, only negative.
22. Without converting, circle all the IEEE 754 negative numbers:
     1837A654h 7A6A3B65h 87B5CDE2h 90A5B5EFh A0000037h D1B8765Ah F0000000h