

## Cpt S 260 Introduction to Computer Architecture

### Homework 2 – Due Wed. Sept. 5<sup>th</sup> in class

In problems 2 through 5 be sure to show your work including the twos- or tens-complement representations of the operands (as required in the problem) for each arithmetic operation.

1. Comer *Essentials of Computer Architecture* problem 3.2
2. Convert 783 (base 10) to 16-bit binary and hex and octal
3. Convert -783 (base 10) to 16-bit two's-complement binary and hex and octal
4. Add -783 and -75 using 16-bit two's complement arithmetic. Check your answer using 4-digit 10's complement arithmetic.
5. Multiply -783 and -56 using 16-bit two's complement arithmetic. Check your answer using normal base-10 arithmetic. What happened? Now do the computation using 32-bit two's complement arithmetic. If you use 10's complement arithmetic how many digits do you have to use to represent the multiplicands in order to get a correct answer? For these multiplication problems I suggest using a calculator capable of hex arithmetic – the Windows calculator for example. The Windows calculator can do 8, 16, 32, or 64 bit hex arithmetic using two's complement notation.
6. Problem 3.4 in Britton *MIPS Assembly Language Programming*. The double-and-add conversion method is explained on p. 26.
7. Problem 3.12 in Britton.

Note: all of the exercises at the end of Ch. 3 in Britton are excellent practice. We haven't yet talked about MIPS assembly language programming used in problems 3.23 and 3.25 but we will! Consider everything in these exercises potential test material.