

CS201 Computer Science I
Homework 2
Due: 9/30, 12noon

This homework corresponds to materials up to Primitive Data. Answer each of the following questions clearly. For every program, include your algorithm in the write-up, use meaningful variable names and comment your code well for readability. Email your report to ctsai@iona.edu with the subject line “Homework2 submission”.

1. **(20 points)** Based on the algorithm presented in class for conversion of numbers from decimal (base 10) to binary (base 2), do the following:
 - Convert 11010_2 to decimal.
 - Convert 1000_{10} to binary.
 - Convert $2B4D_{16}$ to decimal.
 - Convert 1000_{10} to hexadecimal
 - Present the algorithm in pseudocode and trace the code with the number 491_{10} for conversion to binary and hexadecimal.

2. **(20 points)** To represent negative numbers using the notation of two’s-complement, invert all the bits and add one to the result. For example, negating 1111, we get $0000 + 1 = 1$. Therefore, 1111 represents -1 . An N -bit two’s-complement numeral system can represent every integer in the range -2^{N-1} to $+2^{N-1} - 1$.
 - Provide the binary representations of all integers that can be encoded using 4 bits in a two’s-complement system.
 - Work out 6 examples to confirm the statement that addition and subtraction can be performed directly without the knowledge of the signs of the operands.