ECE/CS 252 Fall 2011 Homework 2 (25 points)
Due in Discussion Friday, September 23, 2011

Instructions: You should do this homework in the groups assigned to you in discussion. You should hand in ONE copy of the homework that lists your discussion section number and names and UW ID numbers of all students. You must *staple* all pages of your homework together to receive full credit.

Warning: Most homework will use questions from your textbook, Patt and Patel's *Introduction to Computing Systems*, which we abbreviate (*ItCS*) . This homework explicitly includes all questions to aid those who are late in obtaining the textbook.

First contact for questions is TA Sean Franey: sfraney@wisc.edu

Problem 1 (1 point)

How many distinct values can be represented by 16 bits?

Problem 2 (3 points)

Complete the following table for conversion between hexadecimal and binary:

Binary	**Hexadecimal**
11 _ _ 0101	C __
0100 1 _ _ 1	__ D
_ _ 11 0110	3 __

Problem 3 (2.5 points)

Using ASCII 8-bit, null-terminated string patterns, represent each of the characters in the string "Fall 2011" using the hexadecimal value. (Only represent the characters between the quotation marks.)

Problem 4 (1.5 points)

Convert the following 8-bit signed 2's complement binary numbers to decimal.

a. 1011 0101
b. 1110 1111
c. 0011 1001

Problem 5 (2 points)

What conditions indicate overflow has occurred when two 2's complement numbers are added.

Problem 6 (3 points)

Find the 2's complement of the following binary numbers

a. 0011 0101
b. 0110 1100
c. 1011 1010

Problem 7 (3 points)

Using 6 bits to represent each number, write the binary representations of 26 and -26 in unsigned, sign-magnitude, 1's complement, and 2's complement.

Problem 8 (2 points)

Compute the following:

1. NOT(0110) AND NOT(1011)
2. NOT(1101 OR (0101 AND 1100))

Problem 9 (4 points)

Write the decimal equivalents for these IEEE floating point numbers.

a. 0 01111111 11000000000000000000000
b. 1 01111110 10000000000000000000000

Problem 10 (3 points)

A programmer attempts to write a program to add two numbers. When the numbers 3 and 7 are added, the result given is the letter 'j'. Explain why this is the result instead of 10.
Hint: consider how the computer might interpret the values as something other than numbers.