Computer Organization
Homework #1
Fall 2008
Due: September 5, 2008 (F)

Chapter 1 Exercises: 13, 14

Chapter 2 Exercises: 5cd, 7, 9b, 11b, 18bc, and the following:

Perform the following calculations:

(a)	(b)	(c)	(d)
1011011_2	1011010_2	$94CF3_{16}$	$94CF3_{16}$
$+\ \underline{0010110}_2$	$-\ \underline{0110111}_2$	$+\ \underline{82A3D}_{16}$	$-\ \underline{82A3D}_{16}$

Since the Book store ran out of texts, I'll supply the text of the exercises from the book:

Chapter 1 Exercises: 13, 14

13. The technologist's notion of Moore's Law is that the number of transistors per chip doubles approximately every 18 months. In the 1990s, Moore's Law started to be described as the doubling of microprocessor power every 18 months. Given this new variation of Moore's Law, answer the following:

a) After successfully completing your computer organization and architecture class, you have a brilliant idea for a new chip design that would make a processor six times faster than the fastest ones on the market today. Unfortunately, it will take you four and a half years to save the money, create the prototype, and build a finished product. If Moore's Law holds, should you spend your money developing and producing your chip or investing in some other venture?

b) Suppose we have a problem that currently takes 100,000 hours of computer time using current technology to solve. Which of the following would give us the solution first: (1) Replace the algorithm used in the current solution by one that runs twice as fast and run it on the current technology, or (2) Wait 3 years, assuming Moore's Law doubles the performance of a computer every 18 months, and find the solution using the current algorithm with the new technology?

14. What are the limitations of Moore's Law? Why can't this law hold forever? Explain.

Chapter 2 Exercises: 5cd, 7, 9b, 11b, 18bc, and the following:

5. Represent the following decimal numbers in binary using 8-bit signed magnitude, one's complement, and two's complement:

c) 119

d) -107

7. Using a "word" of 4 bits, list all of the possible signed binary numbers and their decimal equivalents that are representable in:

a) Signed magnitude

b) One's complement

c) Two's complement

9. Given a (very) tiny computer that has a word size of 6 bits, what are the smallest negative numbers and largest positive numbers that this computer can represent in each of the following representations?

b) Two's complement

11. Perform the following binary multiplications, assuming unsigned integers:

b) 10101 x 111

18. Perform the following binary multiplication using Booth's algorithm, assuming signed two's complement integers:

b) 0011 x 1011

c) 1011 x 1100