Homework 1

1.5. (Section 1.2) Convert the following binary numbers to decimal numbers:

a. 100

b. 1011

c. 0000000000001

d. 111111

e. 101010

1.8. (Section 1.2) Convert the following decimal numbers to binary numbers using the subtraction method:

a. 9

b. 15

c. 32

d. 140

1.15. (Section 1.2) Convert the following binary numbers to hexadecimal:

a. 11110000

b. 11111111

c. 01011010

d. 1001101101101

1.18. (Section 1.2) Convert the following hexadecimal numbers to binary:

a. FF

b. F0A2

c. 0F100

d. 100

2.11. (Section 2.4) We want to design a system that sounds a buzzer inside our home whenever motion outside is detected at night. Assuming we have a motion sensor with output M that indicates whether motion is detected (M=1 means motion detected) and a light sensor with output L that indicates if light is detected (L means light is detected). The buzzer inside the home has a single input B that when 1 creates a loud warning sound. Using AND, OR, and NOT gates, create a simple digital circuit to implement the motion detector at night system.

2.13. (Section 2.4) Convert each of the following equations directly to gate-level circuits:

a. F = ab + b'

b. F = abc + def + acf + f'

c. F = ((a + b)*(c)) + (d + e + fg)

2.18. (Section 2.5) Use algebraic manipulation to convert the following equation to sum-of-products form: F = a(b + c)(d') + ac'(b + d)

2.24. (Section 2.6) Convert the following Boolean equations to a truth table.

a. F(a,b,c) = a'b + ac

b. F(a,b,c) = abc + a'bc + a'c'

c. F(a,b,c) = abc + a'b'c' + b'c

d. F(a,b,c,d) = a'bcd + ab'cd + abc'd + abcd'

2.28. (Section 2.6) Convert the function F shown in the truth table in Table 2.6 to an equation. Don't minimize the equation.

Table 2.6: Truth table.

a	b	c	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

2.29. (Section 2.6) Use algebraic manipulation to minimize the equation obtained in Exercise 2.28.