Digital engineering 1st report

디지털 공학 과제 주의사항

과제는 반드시 **자필**로 작성하셔야 합니다.
문제 풀이 과정이 다 들어가 있어야 하며, 제출 기한은 **3월 26일 수업시간 전까지**입니다,
A4용지에 반드시 풀이과정과 학번 이름을 포함하여 수업시간 전 강의실 교탁 위에 제출해 주시기 바랍니다.
문제는 **7판 원서** 기준으로 출제되었습니다.

1.2 Convert to octal. Convert to hexadecimal. Then convert both of your answers to decimal, and verify that they are the same.
(a) 111010110001.011_2 (b) 10110011101.11_2

1.5 Add, subtract, and multiply in binary:
(a) 1111 and 1010 (b) 110110 and 11101 (c) 100100 and 10110

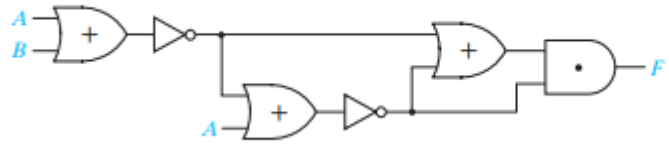
1.20 Divide in binary:
(a) 10001101 ÷ 110 (b) 110000011 ÷ 1011 (c) 1110100 ÷ 1010

1.29 Is it possible to construct a 5-3-1-1 weighted code? A 6-4-1-1 weighted code? Justify your answers.

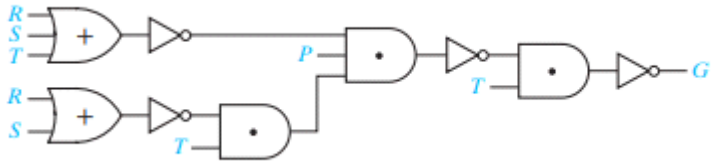
1.37 Because $A - B = A + (-B)$, the subtraction of signed numbers can be accomplished by adding the complement. Subtract each of the following pairs of 5-bit binary numbers by adding the complement of the subtrahend to the minuend. Indicate when an overflow occurs. Assume that negative numbers are represented in 1's complement. Then repeat using 2's complement.

(a)	(b)	(c)	(d)	(e)
01001	11010	10110	11011	11100
−11010	−11001	−01101	−00111	−10101

2.9 Find F and G and simplify:



(a)



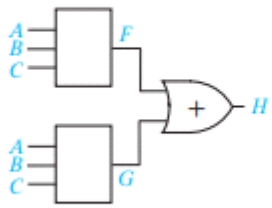
(b)

2.15 Use only DeMorgan's relationships and Involution to find the complements of the following functions:

(a) $f(A, B, C, D) = [A + (BCD)'][(AD)' + B(C' + A)]$

(b) $f(A, B, C, D) = AB'C + (A' + B + D)(ABD' + B')$

2.21 In the following circuit, $F = (A' + B)C$. Give a truth table for G so that H is as specified in its truth table. If G can be either 0 or 1 for some input combination, leave its value unspecified.



A	B	C	H
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	0
1	1	1	1

2.28 Draw a circuit to realize the function:

$$F = ABC + A'BC + AB'C + ABC'$$

(a) using one OR gate and three AND gates. The AND gates should have two inputs.

(b) using two OR gates and two AND gates. All of the gates should have two inputs.

2.29 Prove the following equations using truth tables:

(a) $(X + Y)(X' + Z) = XZ + X'Y$

(b) $(X + Y)(Y + Z)(X' + Z) = (X + Y)(X' + Z)$

(c) $XY + YZ + X'Z = XY + X'Z$

(d) $(A + C)(AB + C') = AB + AC'$

(e) $W'XY + WZ = (W' + Z)(W + XY)$

(*Note:* Parts (a), (b), and (c) are theorems that will be introduced in Unit 3.)