

Digital engineering 1st report

디지털 공학 과제 주의사항

과제는 반드시 **자필**로 작성하셔야 합니다.

문제 풀이 과정이 다 들어가 있어야 하며, 제출 기한은 **3월 30일 수업시간 전까지**입니다. A4용지에 반드시 풀이과정과 학번 이름을 포함하여 **수업시간 전** 강의실 교탁 위에 제출 해주시기 바랍니다. (늦게 제출 시 페널티 감점 있습니다.)

문제는 **7판 원서** 기준으로 출제되었습니다.

1.3 Convert to base 6: $3BA.25_{14}$ (do all of the arithmetic in decimal).

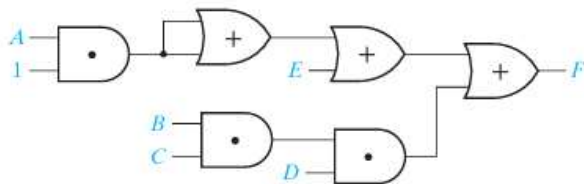
1.11 Convert to octal. Convert to hexadecimal. Then convert both of your answers to decimal, and verify that they are the same.

(a) 101111010100.101_2 (b) 100001101111.01_2

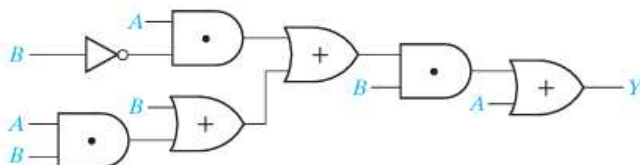
1.38 Work Problem 1.37 for the following pairs of numbers:

(a) $\begin{array}{r} 11010 \\ -10100 \end{array}$ (b) $\begin{array}{r} 01011 \\ -11000 \end{array}$ (c) $\begin{array}{r} 10001 \\ -01010 \end{array}$ (d) $\begin{array}{r} 10101 \\ -11010 \end{array}$

2.4 For each of the following circuits, find the output and design a simpler circuit having the same output. (*Hint*: Find the circuit output by first finding the output of each gate, going from left to right, and simplifying as you go.)



(a)



(b)

2.6 Factor each of the following expressions to obtain a product of sums:

- (a) $AB + C'D'$ (b) $WX + WY'X + ZYX$
 (c) $A'BC + EF + DEF'$ (d) $XYZ + W'Z + XQ'Z$
 (e) $ACD' + C'D' + A'C$ (f) $A + BC + DE$

(The answer to (f) should be the product of four terms, each a sum of three variables.)

2.8 Simplify the following expressions to a minimum sum of products.

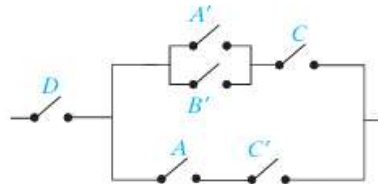
- (a) $[(AB)' + C'D]'$ (b) $[A + B(C' + D)]'$ (c) $((A + B')C')(A + B)(C + A)'$

2.14 Draw a circuit that uses only one AND gate and one OR gate to realize each of the following functions:

- (a) $ABCF + ACEF + ACDF$
 (b) $(V + W + Y + Z)(U + W + Y + Z)(W + X + Y + Z)$

2.20 For the following switch circuit:

- (a) derive the switching algebra expression that corresponds one to one with the switch circuit.
 (b) derive an equivalent switch circuit with a structure consisting of a parallel connection of groups of switches connected in series. (Use 9 switches.)
 (c) derive an equivalent switch circuit with a structure consisting of a series connection of groups of switches connected in parallel. (Use 6 switches.)



2.27 Draw a circuit that uses two OR gates and two AND gates to realize the following function:

$$F = (V + W + X)(V + X + Y)(V + Z)$$

2.30 Show that the following two gate circuits realize the same function.

