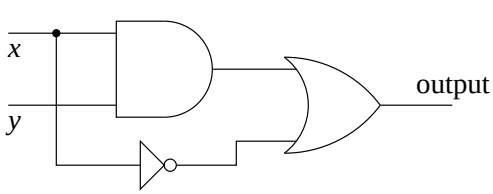
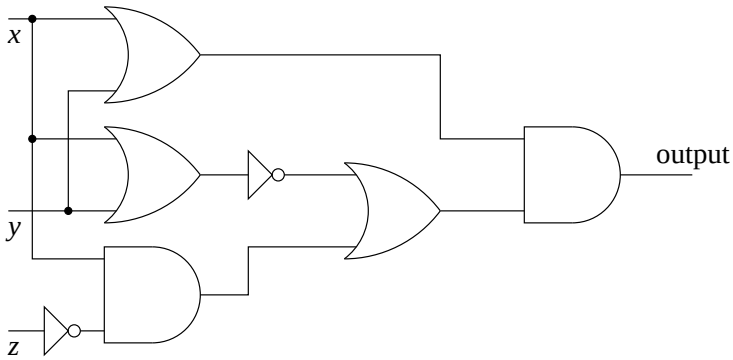
Question 2.1–1: (Solution, p 3) Write a truth table tabulating the following circuits' behaviors.

a.



b.



Question 2.2–1: (Solution, p 3) Draw a circuit representing each of the following Boolean expressions.

a. $x + \overline{x + y}$

b. $\overline{xy + \bar{x}\bar{y}}$

Question 2.2–2: (Solution, p 3) Draw a truth table corresponding to each of the following expressions.

a. $x + \overline{x + y}$

b. $xy + \overline{x + z}$

Question 2.2–3: (Solution, p 4) What is the *unsimplified* sum-of-products expression for the following truth tables? (Use multiplication for AND, addition for OR.)

a.

x	y	answer
0	0	1
0	1	0
1	0	1
1	1	0

b.

x	y	answer
0	0	1
0	1	1
1	0	0
1	1	1

Question 2.2–4: (Solution, p 4) Simplify the following sum-of-products expressions. If it cannot be simplified using the technique from class, you may simply state this fact. Show your work.

a. $xy + \bar{x}y + x\bar{y}$

b. $\bar{x}yz + x\bar{y}z + xy\bar{z} + \bar{x}\bar{y}\bar{z}$

c. $\bar{x}yz + x\bar{y}\bar{z} + x\bar{y}z + xy\bar{z} + xyz$

Question 3.1–1: (Solution, p 4) How many bits do you need to represent seven different values? Nine? Twelve? Thirty?

Question 3.1–2: (Solution, p 4) Perform the following conversions.

a. $1010101_{(2)}$ to octal.

b. $1010101_{(2)}$ to hexadecimal.

c. $1010101_{(2)}$ to decimal.

d. $560_{(8)}$ to decimal.

e. $560_{(8)}$ to binary.

f. $\mathrm{CAB}_{(16)}$ to binary.

g. $\mathrm{CAB}_{(16)}$ to decimal.

h. $95_{(10)}$ to binary.

i. $95_{(10)}$ to octal.

j. $95_{(10)}$ to hexadecimal.

Solution 2.1–1: (Question, p 1)

a.

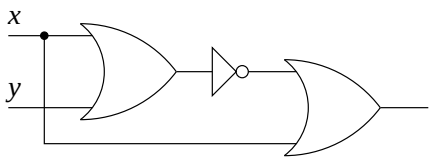
x	y	answer
0	0	1
0	1	1
1	0	0
1	1	1

b.

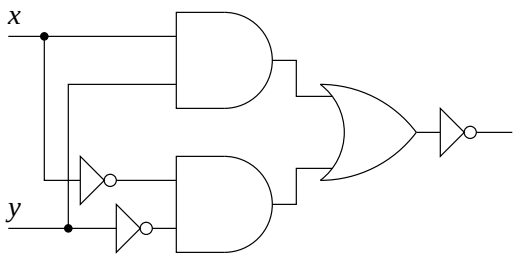
x	y	z	answer
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

Solution 2.2–1: (Question, p 1)

a.



b.



Solution 2.2–2: (Question, p 1)

a.

x	y	answer
0	0	1
0	1	0
1	0	1
1	1	1

b.

x	y	z	answer
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Solution 2.2–3: (Question, p 1)

a. $\overline{x}\overline{y} + x\overline{y}$

b. $\overline{x}\overline{y} + \overline{x}y + xy$

Solution 2.2–4: (Question, p 1)

a. $x + y$

b. This expression cannot be simplified further using the sum-of-products technique from class.

c. $yz + x$

Solution 3.1–1: (Question, p 2) You need 3 bits for seven values, 4 for nine or twelve, and 5 for thirty values.

Solution 3.1–2: (Question, p 2)

a. $125_{(8)}$

b. $55_{(16)}$

c. $85_{(10)}$

d. $368_{(10)}$

e. $101110000_{(2)}$

f. $1100\,1010\,1011_{(2)}$

g. $3243_{(10)}$

h. $1011111_{(2)}$

i. $137_{(8)}$

j. $5\mathrm{F}_{(16)}$