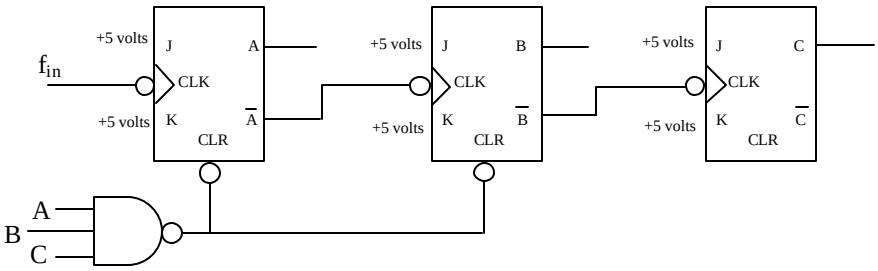
Homework #6

Digital Electronics — Dr. Pogo

Assignment is due on Thursday, April 24, 2008 — Assigned April 8, 2008

1. The counting circuit shown has output *CBA*. If f_{in} is an oscillating input, what is the sequence of outputs generated?



2. Create a similar circuit that counts up from 0 through 5.

3. Convert the following decimal numbers into eight bit twos-complement representation.

a. +32	e. +127	i. –1	m. +84
b. –14	f. –127	j. –128	n. +3
c. +63	g. +89	k. +169	o. –3
d. –104	h. –55	l. 0	p. –190

4. Convert the following eight bit twos-complement numbers into decimal form.

a. 01101	e. 01111111	i.01100011
b. 11101	f. 10000000	j. 11011001
c. 01111011	g. 11111111	
d. 10011001	h. 10000001	

5. a) What are the largest and smallest decimals that can be represented using 12-bit twos-complement representation? b) If you want to represent values from –32768 to +32767, inclusive, how many bits would you need?

6. By hand, showing all steps and carry bits, complete these operations in base 10 and in base 2 (eight-bit twos complement), including error check bits. State whether any carry bit was ignored.

a. (+9) + (+6)	e. (+17) – (+16)	i. (–17) + (+17)
b. (+14) + (–17)	f. (–13) – (+21)	j. (–17) – (–17)
c. (+19) + (–24)	g. (+47) + (–47)	h. (+37) + (+95)
d. (–48) + (–80)	h. (–15) + (–36)	i. (–95) – (+37)

7. The circuit shown is supposed to be a BCD adder. Determine the outputs $Q_4Q_3Q_2Q_1Q_0$ for the nine sets of inputs. What is unusual about the eighth case?

X_3	X_2	X_1	X_0	Y_3	Y_2	Y_1	Y_0	Z_0
0	0	1	0	0	1	1	0	0
0	1	1	1	1	0	0	0	0
1	0	0	1	1	0	0	1	0
0	1	1	1	0	0	1	1	0
0	0	1	1	0	1	0	1	1
0	1	1	1	0	1	0	1	1
1	0	0	1	1	0	0	1	1
1	0	1	1	0	0	1	1	1
0	1	1	0	0	1	1	1	1