

## Physics 4700 Homework VII

Due April 3

1. Simpson: Problem 3, page 595
  - a. Convert  $(49)_{10}$  to  $( )_2$
  - b. Convert  $(49)_{10}$  to  $( )_8$
  - c. Convert  $(49)_{10}$  to  $( )_{16}$
2. Convert the following binary numbers to decimal:
  - a. 1110101.0110
  - b. 11.01010101...repeats

3. Simpson: Problem 10, page 595

Diagram how you would implement the following functions using,

- a. only NAND gates
- b. only NOR gates

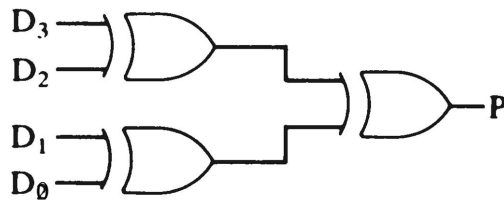
$$F = A \cdot \bar{B} + \bar{A} \cdot B$$

$$F = A \cdot B$$

$$F = A + B$$

$$F = \bar{A}$$

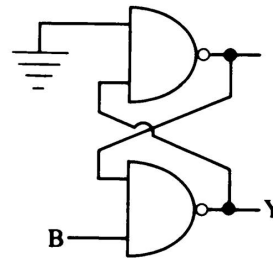
4. Simpson: Problem 12, Page 596



Write the truth table for P in terms of  $D_3$ ,  $D_2$ ,  $D_1$ ,  $D_0$ . What is P called?

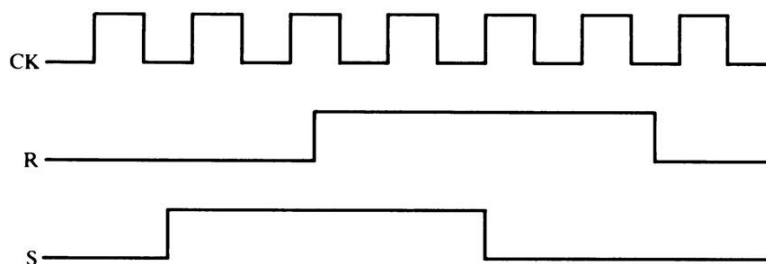
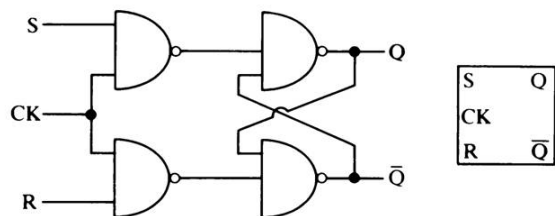
5. Simpson: Problem 4, page 665

What is the relationship between B and Y?



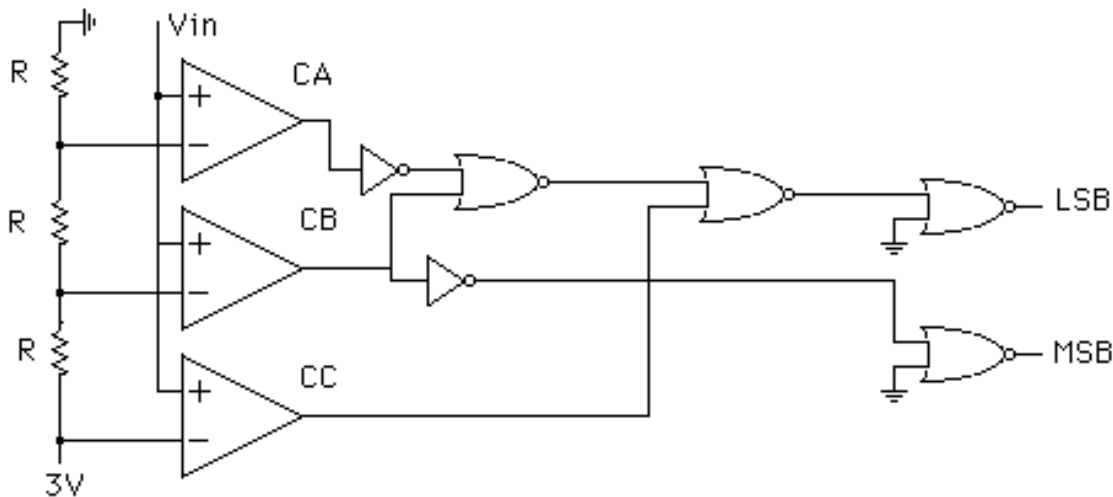
6. Simpson: Problem 8, page 666

For the clocked RS flip-flop shown, with  $Q = 0$ ,  $\bar{Q} = 1$  initially, sketch  $Q$ . If  $R$  is held at 0, sketch  $Q$  for the CK and S inputs shown.



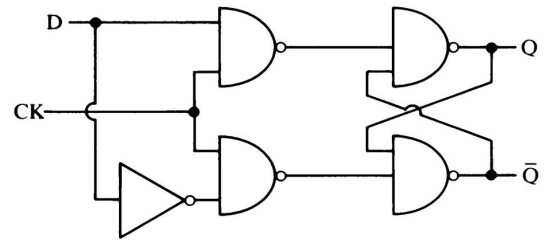
7. The following circuit can be used to convert an input analog voltage to a digital output voltage.  $C_A$ ,  $C_B$ , and  $C_C$  are comparators which give a logic level 1 if the positive input (+) is greater than the negative input. The outputs, LSB and MSB stand for least significant bit and most significant bit respectively. Complete the following truth table. You will have a chance to build something similar to this in lab.

V <sub>input</sub> (V)	C <sub>A</sub>	C <sub>B</sub>	C <sub>C</sub>	LSB	MSB
0.5					
1.5					
2.3					
4.0					



8. Simpson: Problem 10, page 666

- Write a truth table.
- Write a standard schematic diagram for this flip-flop.
- This flip-flop is usually called a \_\_\_\_ flip-flop.



9. Simpson: Problem 22, page 667

Design a synchronous counter that will count through the sequence 1, 3, 5, 7, 9, 1, 3, 5, 7, 9... using JK flip-flops.