Physics 4700 Homework VII

Due December 6

1. Convert $(49)_{10}$ to the following
   a. $(\ )_2$
   b. $(\ )_8$
   c. $(\ )_{16}$

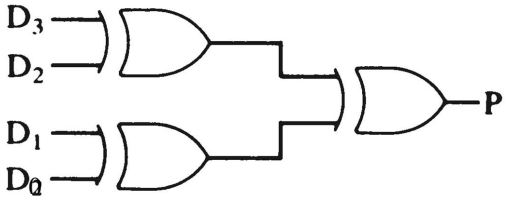
2. Convert the following binary numbers to decimal:
   a. 1110101.0110
   b. 11.01010101...repeats

3. Diagram how would you implement the following functions using,
   a. only NAND gates
   b. only NOR gates

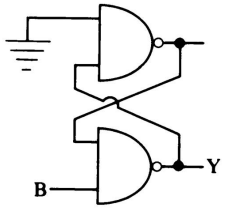
   $F = A \cdot \bar{B} + \bar{A} \cdot B$ $\qquad$ $F = A + B$

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

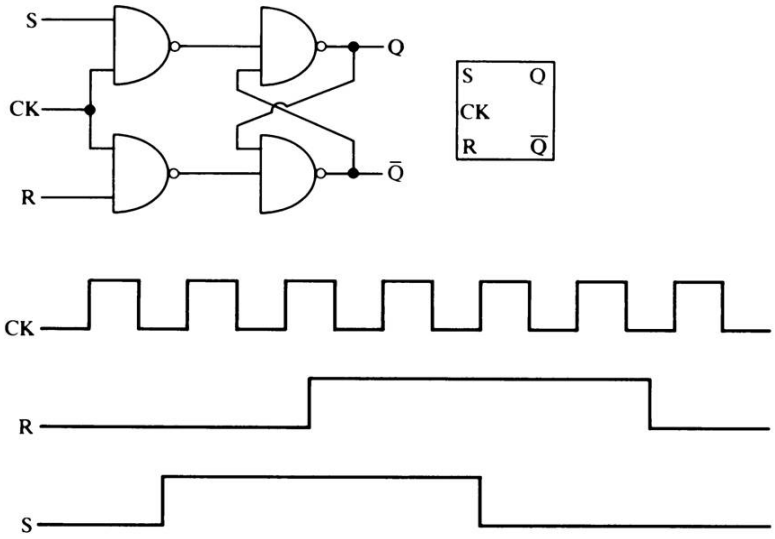
4. Write the truth table for P in terms of D_3, D_2, D_1, D_0. What is P called?



5. What is the relationship between B and Y?

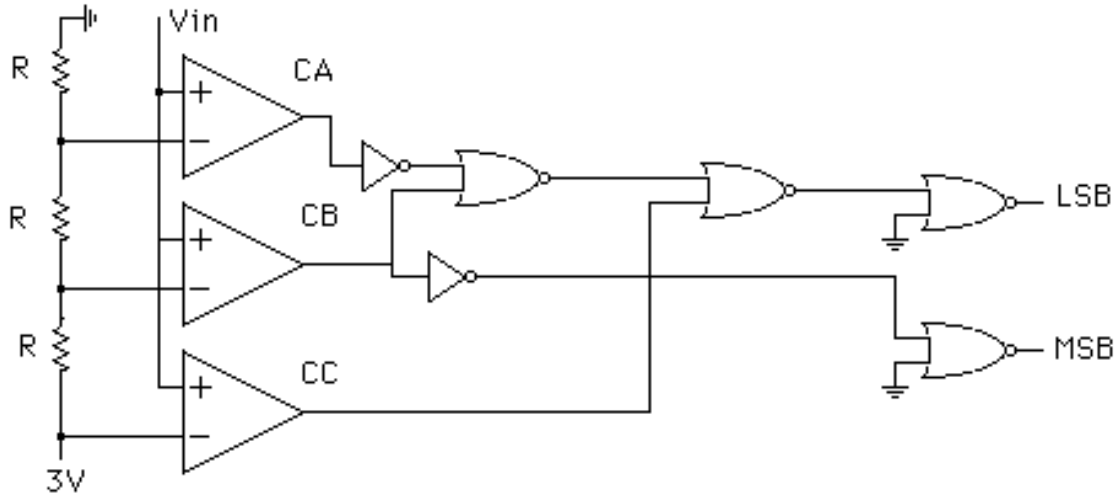


6. For the clocked RS flip-flop shown, with $Q = 0$, $\overline{Q} = 1$ initially, sketch Q. If R is held at 0, sketch Q for the CK and S inputs shown.



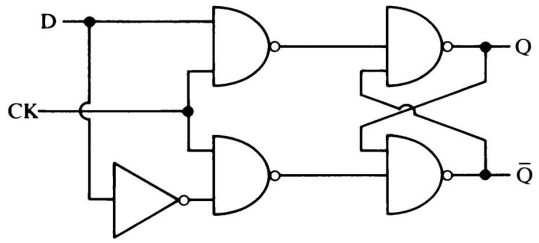
7. The following circuit can be used to convert an input analog voltage to a digital output voltage. C_A, C_B, and C_C are comparators which give a logic level 1 if the positive input (+) is greater than the negative input. The outputs, LSB and MSB stand for least significant bit and most significant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

V_{input} (V)	C_A	C_B	C_C	LSB	MSB
0.5					
1.5					
2.3					
4.0					



8. For the following circuit,
   a. Write a truth table.
   b. Write a standard schematic diagram for this flip-flop.

c. This flip-flop is usually called a ____ flip-flop.



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