

## Physics 4700 Homework VII

Due April 18

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

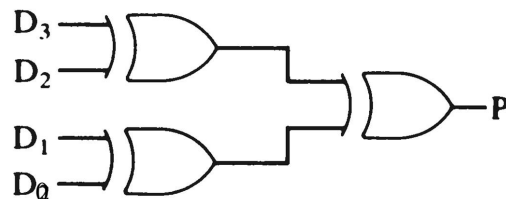
$$F = A \cdot \bar{B} + \bar{A} \cdot B$$

$$F = A \cdot B$$

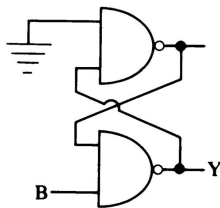
$$F = A + B$$

$$F = \bar{A}$$

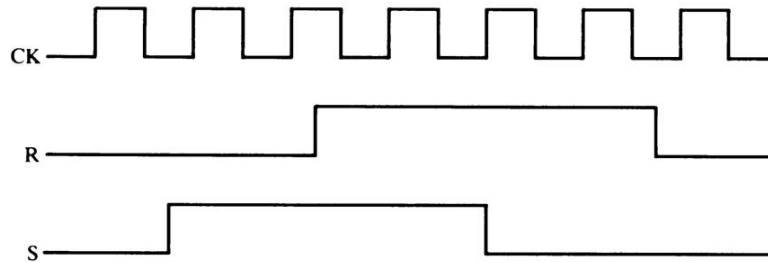
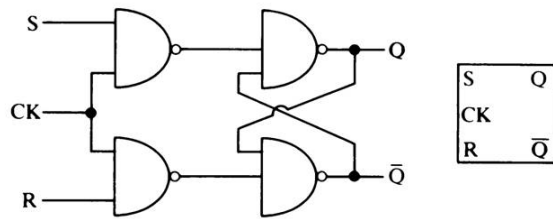
4. Write the truth table for P in terms of  $D_3, D_2, D_1, D_0$ . What is P called?



5. What is the relationship between B and Y?

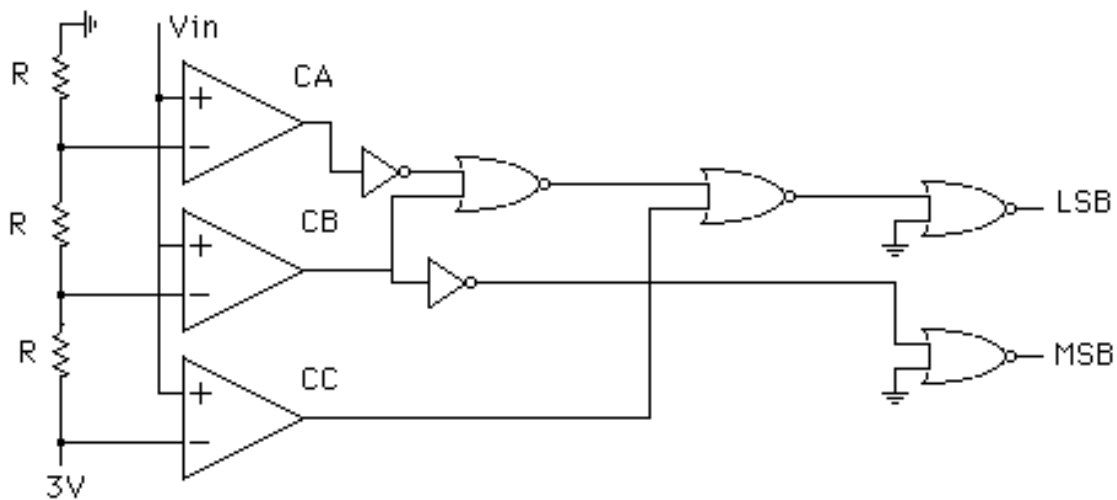


6. For the clocked RS flip-flop shown, with  $Q = 0, \bar{Q} = 1$  initially, sketch Q. If R is held at 0, sketch Q for the CK and S inputs shown.

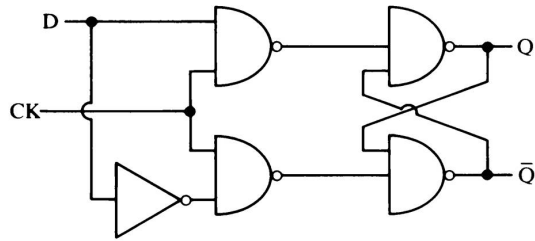


7. The following circuit can be used to convert an input analog voltage to a digital output voltage.  $C_A$ ,  $C_B$ , and  $C_C$  are comparators which give a logic level 1 if the positive input (+) is greater than the negative input. The outputs, LSB and MSB stand for least significant bit and most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

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



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