

Physics 4700 Homework VII

Due November 27

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 would you implement the following functions using,
 - a. only NAND gates
 - b. only NOR gates

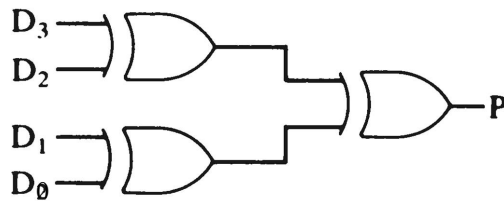
$$F = A \cdot \bar{B} + \bar{A} \cdot B$$

$$F = A \cdot B$$

$$F = A + B$$

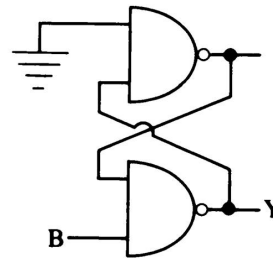
$$F = \bar{A}$$

4. Simpson: Problem 12, Page 596



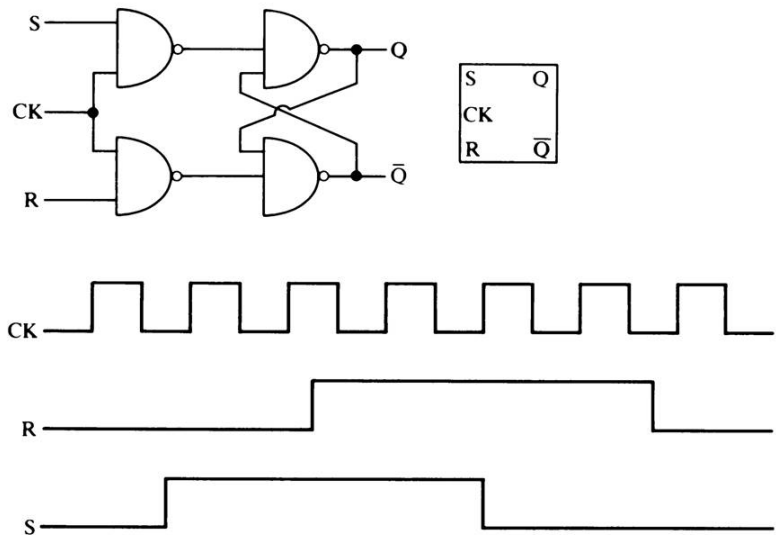
Write the truth table for P in terms of D_3 , D_2 , D_1 , D_0 . What is P called?

5. Simpson: Problem 4, page 665
What is the relationship between B and Y?



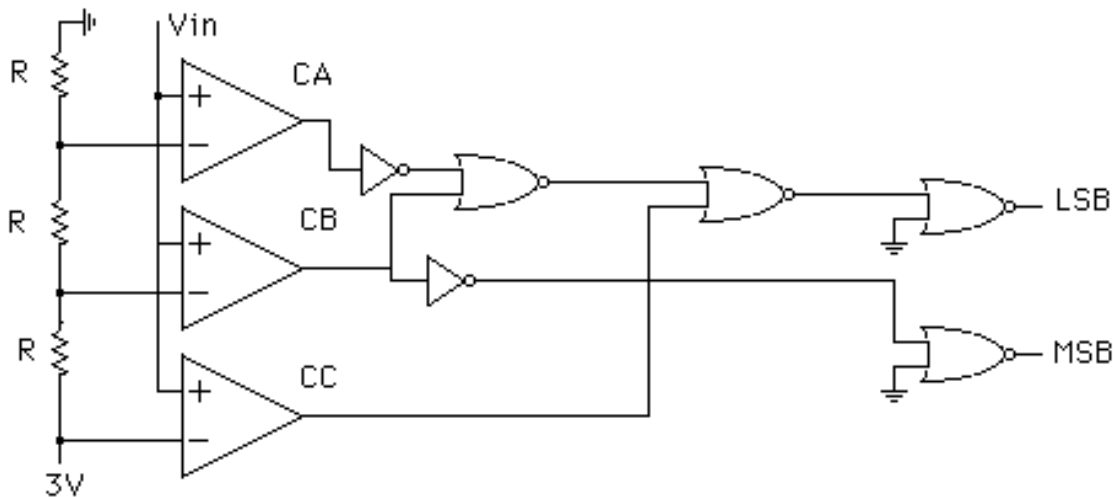
6. Simpson: Problem 8, page 666

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.



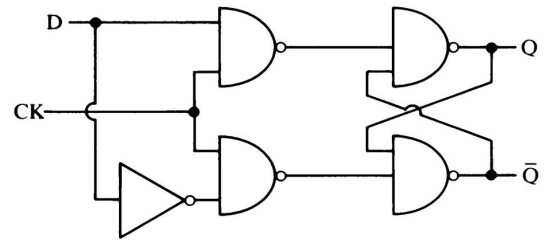
7. The following circuit can be used to convert an input analog voltage to a digital output voltage. C_A , C_B , and C_C are comparators which give a logic level 1 if the positive input (+) is greater than the negative input. The outputs, LSB and MSB stand for least significant bit and most significant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

$V_{input} (V)$	C_A	C_B	C_C	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.