

Homework 1: Number Systems, Digital Logic

This assignment is to be submitted electronically via Gradescope. You must upload your answers as a PDF to Gradescope by Friday, 2/15/19 at 11:59pm.

1. For each of the following cases, determine whether the addition of the two numbers given would cause an overflow. Assume all numbers are signed and stored as 4-bit binary numbers. (20 points)

1a. 3 and 4

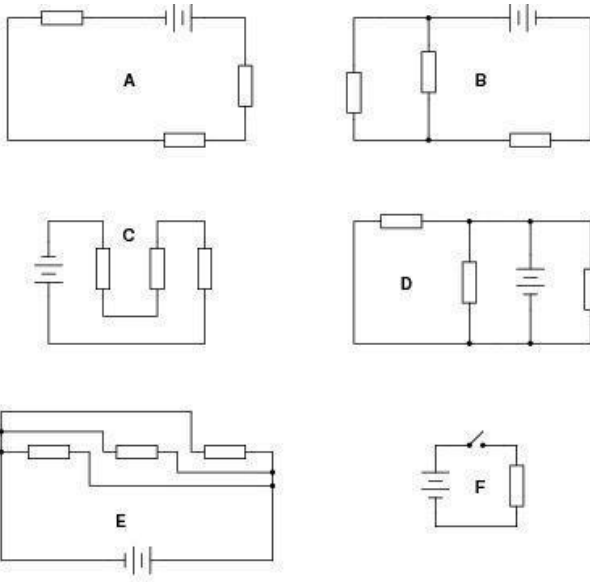
1b. 4 and 5

1c. -3 and 6

1d. -6 and -5

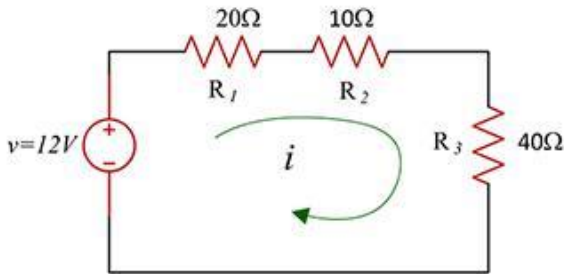
1e. -2 and -6

2. Identify which of these circuits contains parallel resistors. (There may be more than one shown!) The resistors are shown as empty rectangles in the diagrams below. (10 points)

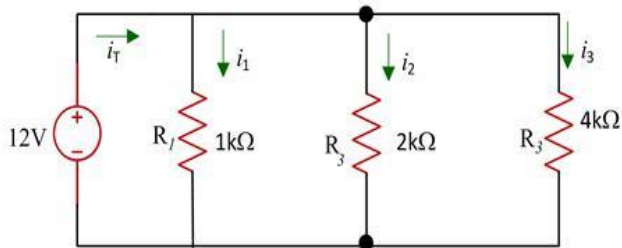


3. Calculate appropriate values for each of the following circuits. Show your work. (40 points)

- 3a. Determine the total Resistance for the circuit. (3 points)
- Determine the Current for the entire circuit. (2 points)
- Determine the Voltage across each of the 3 resistors (3 points each)

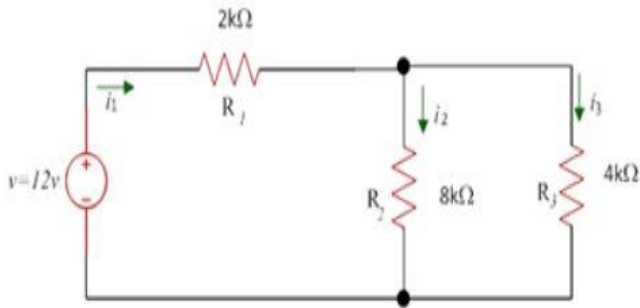


- 3b. Determine the total Resistance for the circuit. (3 points)
- Determine the Current for the entire circuit. (2 points)
- Determine the Current passing through each of the 3 resistors (3 points each)

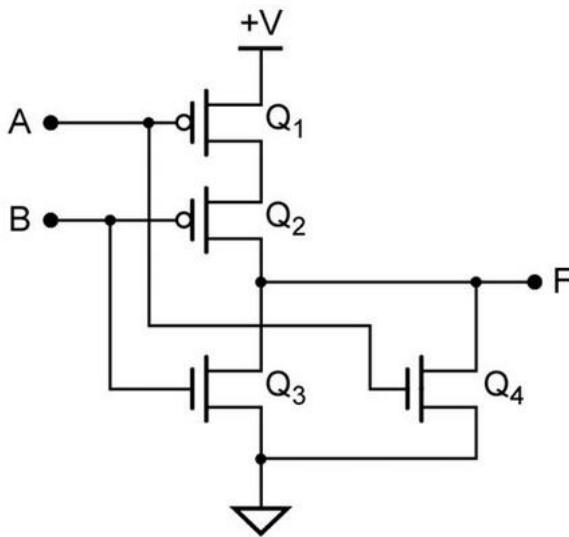


Note the 2kΩ resistor in the middle should be labeled: “R₂”

- 3c. Determine the total Resistance for the circuit. (3 points)
 Determine the Current for the entire circuit. (3 points)
 Determine the Current passing through each of the 3 resistors (2 points each)



4. Write the truth table for the CMOS Circuit given below and specify which logic gate it represents. (10 points)



5. Write the truth table and equation for the following circuit diagram. (20 points)

