

CSCE 312 Lab 2
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Problem 1

1. Both diagrams are in the files titled 'Lab2-prob1.circ'. Circuit A is above Circuit B in the '.circ' file.
2. I would use:
 - 74LS08 (AND) [x3]
 - 74LS32 (OR) [x2]
 - 74LS16 (NOT) [x1]
3. The 74LS08 has a delay of 18ns, 74LS32 has a delay of 15ns, and the 74LS16 has a delay of 20ns. Circuit A would take 96ns and circuit B would take 91ns.
4. I used the data sheets linked on the following link:
<http://rabbit.eng.miami.edu/info/datasheets/>. Using the value ' t_{PHL} '.
5. I would use logic gates that allow for more than two inputs.
6. I would use a 74LS11 which allows for 3 inputs on an AND gate with the same 18ns delay. I would also use a 744075 which allows for 3 inputs on an OR gate with a delay of 10ns. This would ultimately reduce the delay on A by 68ns to a total of 28ns and circuit B by 23 ns to a total of 68ns.

Problem 2

1. Competed in part 6 of problem 1.
2. Competed in part 6 of problem 1.
3. Competed in part 6 of problem 1.

Problem 3

1. We would need 7 switches, one for each car including the motorcar. This means there are 7 inputs and 3 outputs. There are 3 bits/wires in the data bus. The decoder will have 3 inputs and 7 outputs. The decoder takes the 3 digit binary output from the encoder and translates it to data to the 'ABCDEFG' values read by the LED display.
2. Common Cathode is the best choice. Common cathodes turn on in response to a 1 and we will be sending a 1 to signal the LED.
3. *Read*
4. See files 'Lab2-prob3.jpg' and Lab2-prob3.circ'.
5. Each car has encoded to a unique 3 bit number.
 - i0 -ENCODE- 000 -DECODE- ACBDEF
 - i1 -ENCODE- 001 -DECODE- BC
 - i2 -ENCODE- 010 -DECODE- ABGED
 - i3 -ENCODE- 011 -DECODE- ABGCD
 - i4 -ENCODE- 100 -DECODE- BCFG
 - i5 -ENCODE- 101 -DECODE- ACDFG
 - i6 -ENCODE- 110 -DECODE- ACDEFG

6. It would not work. It would require additional LED displays or a timer to rotate between the numbers.