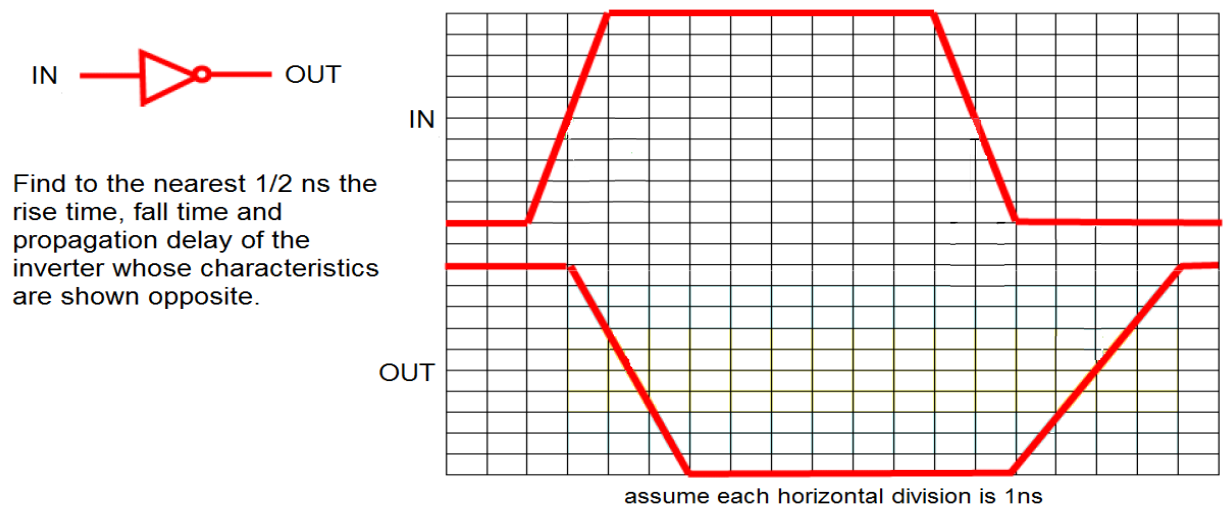


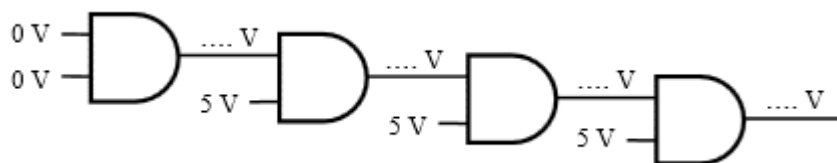
EEE225 Problem Sheet 1 - NJP

1.



Note: Rise time and fall time here relate to the output response.

- You observe a square wave pulse on an oscilloscope and notice 'ringing' on the pulse. Sketch the pulse. What is the likely cause of this 'ringing'.
- Which 5-Volt CMOS logic family has the lowest static power dissipation AC, HC, LV-A, or ABT? (use your logic family table from Lecture1 to check the quiescent current)
- Diode Logic (DL) is used to implement the circuit shown below. Assuming a diode volt drop of 0.7V, what will the voltage be at each AND gate output? Is the final output correct? If not, explain why not.



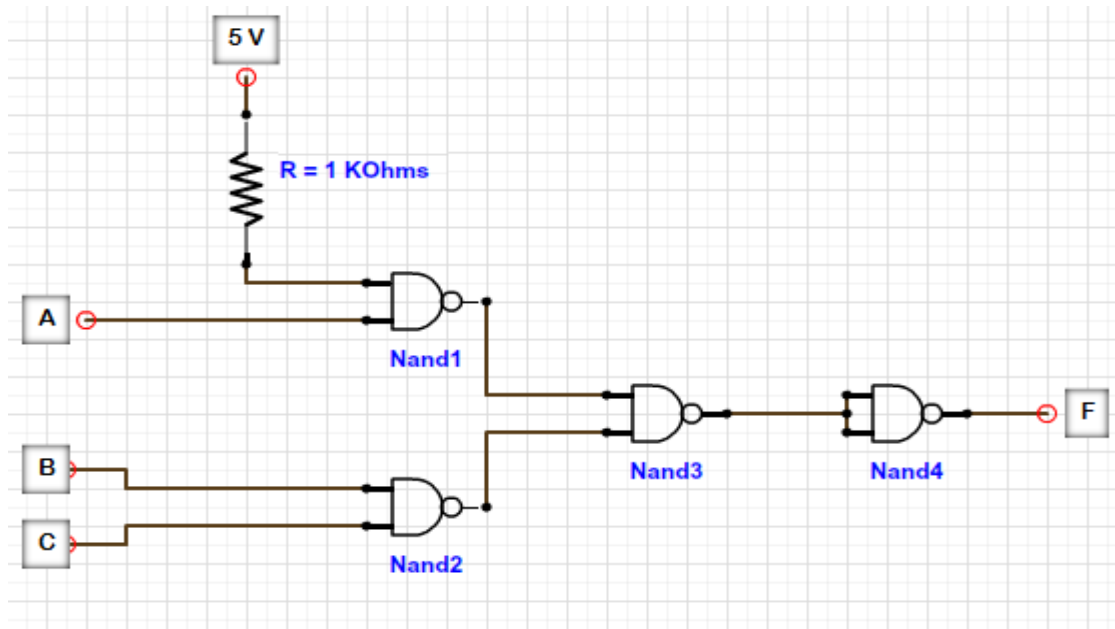
(Use the logic levels given in lecture1 for diode logic)

- With the aid of a block diagram, compare and contrast the structural features of a TTL NAND gate with a CMOS NAND gate.
- Considering the structures in question5, what modifications would be necessary to increase the fan-in from two to four in each case?

Turn Over

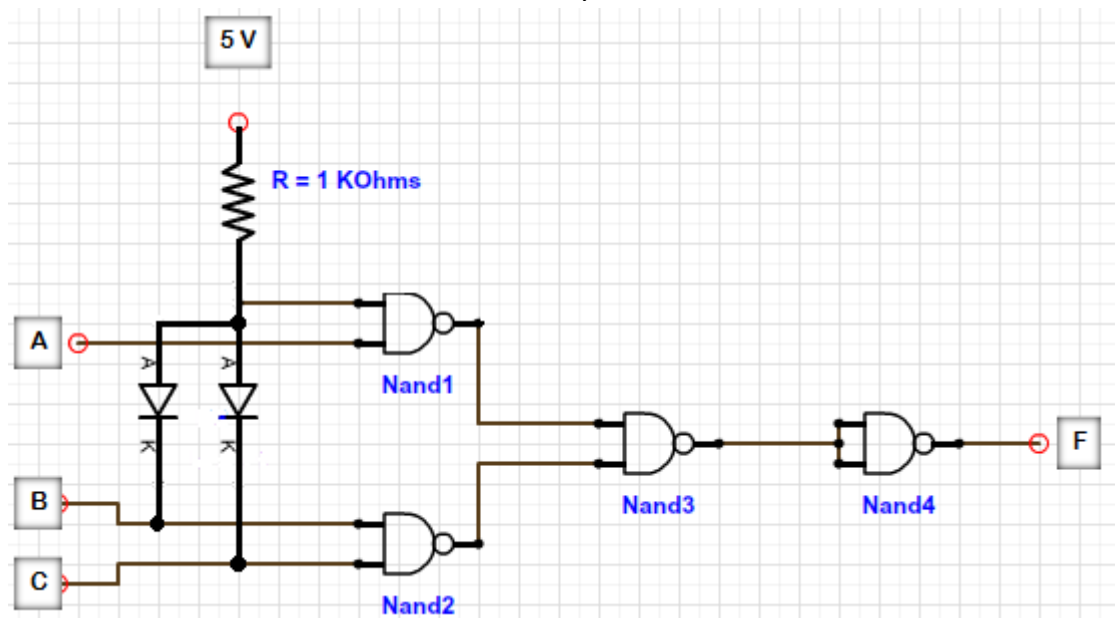
For experts:

7. Bodge It Circuits Inc. produced 10,000 circuit boards for the controller of a car seatbelt alarm. It was based on a 74LS00 quad inverter and implemented the circuit shown.



Draw a truth table for this circuit.

It was later discovered that the functionality was incorrect. It was not possible to change the chip but fortunately, the problem was solved by the addition of two diodes as shown. Show the new functionality on the truth table.



Was there a simpler solution that Bodge It could have used?
(Hint : Use Boolean Algebra to find the minimal logic required)