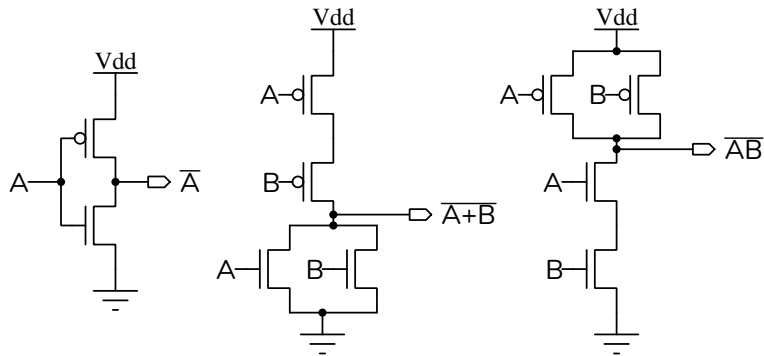


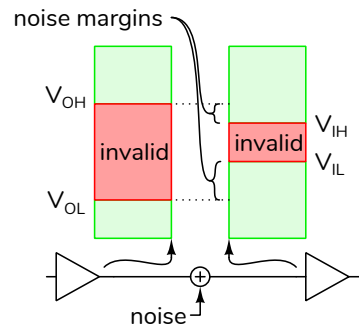
Implementation of Digital Logic Circuits

Exercise 1:



In which direction does the output current flow when the output is high? When it is low? Which transistors are on in each case?

Exercise 2:



Which of these specifications does the manufacturer guarantee?
Which are requirements?

Exercise 3: A logic family has $V_{OH}(\min) = 5 \text{ V}$, $V_{OL}(\max) = 0.5 \text{ V}$, $V_{IH}(\min) = 4 \text{ V}$ and $V_{IL}(\max) = 1.5 \text{ V}$. What are the noise margins?

Exercise 4: All else being equal, by how much would we expect to decrease power consumption when reducing logic levels from 5 V to 3.3 V? What would be the effect on power consumption in reducing the clock frequency from 50 MHz to 1 MHz?

Exercise 5: The energy stored in a battery (its “capacity”) is measured in Watt-hours. If a circuit draws 100 mA for 100 μ s per second and draws 100 mA the rest of the time, how long will a 1000 mAh battery last?

Exercise 6: What are the active-state current and the RC time constant for a wired-or interrupt-request line using a $10\text{k}\Omega$ resistor pulling up a circuit with 50 pF capacitance to 3.3 V ?

Exercise 7: How many square mm of PCB area does each package require? Which packages have their pins accessible when the package is placed on the PCB?