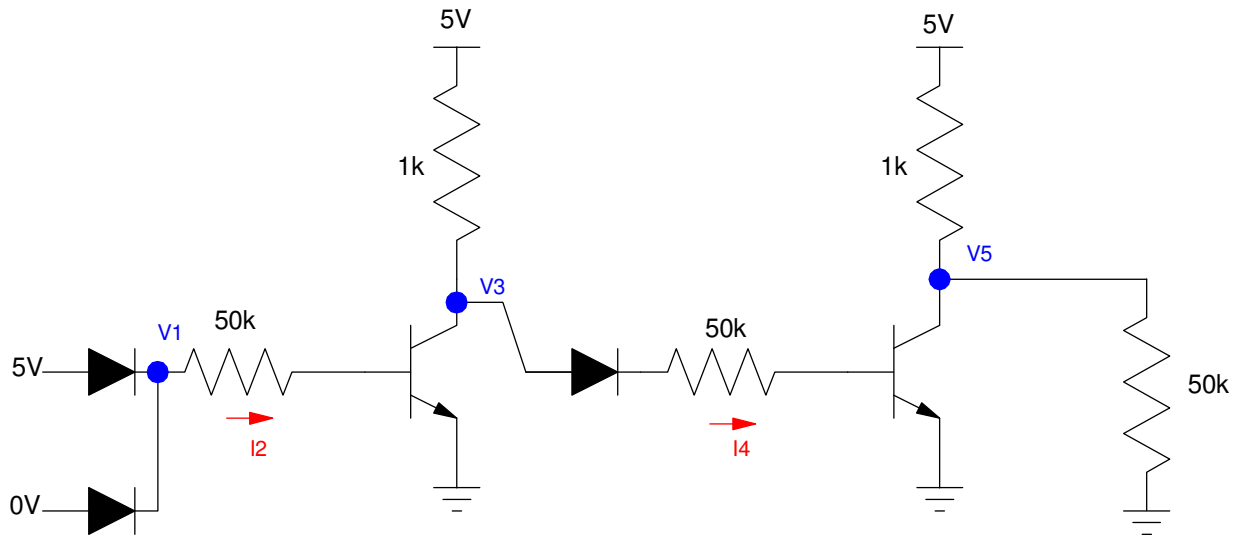


ECE 320 - Homework #8

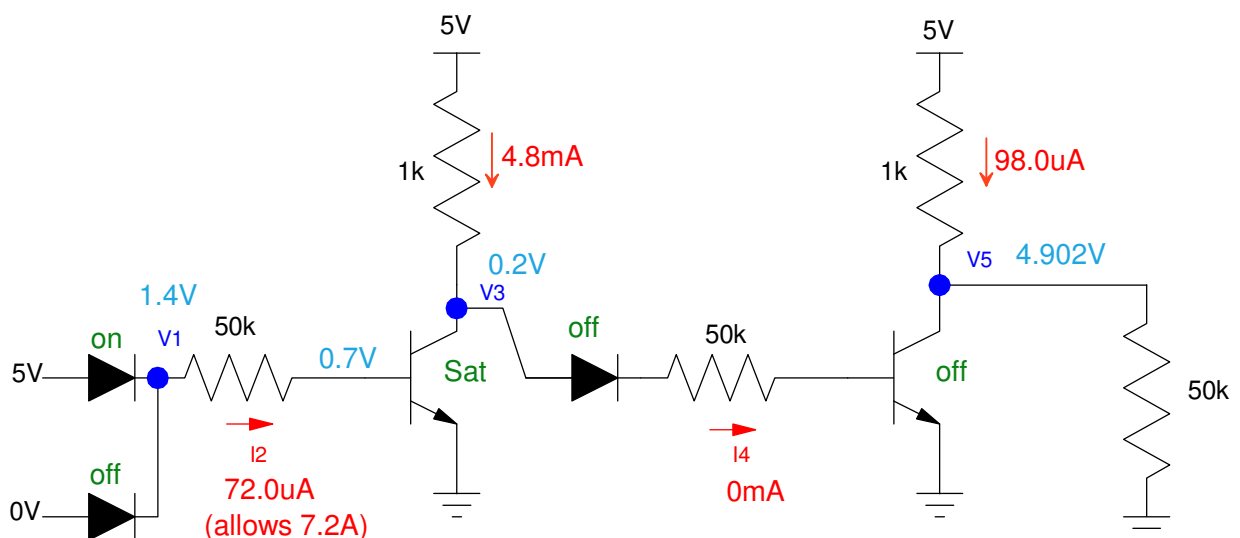
DTL, TTL Logic Due Monday, March 6th
Please email to jacob.glower@yahoo.com, or submit as a hard copy, or submit on BlackBoard

DTL Logic

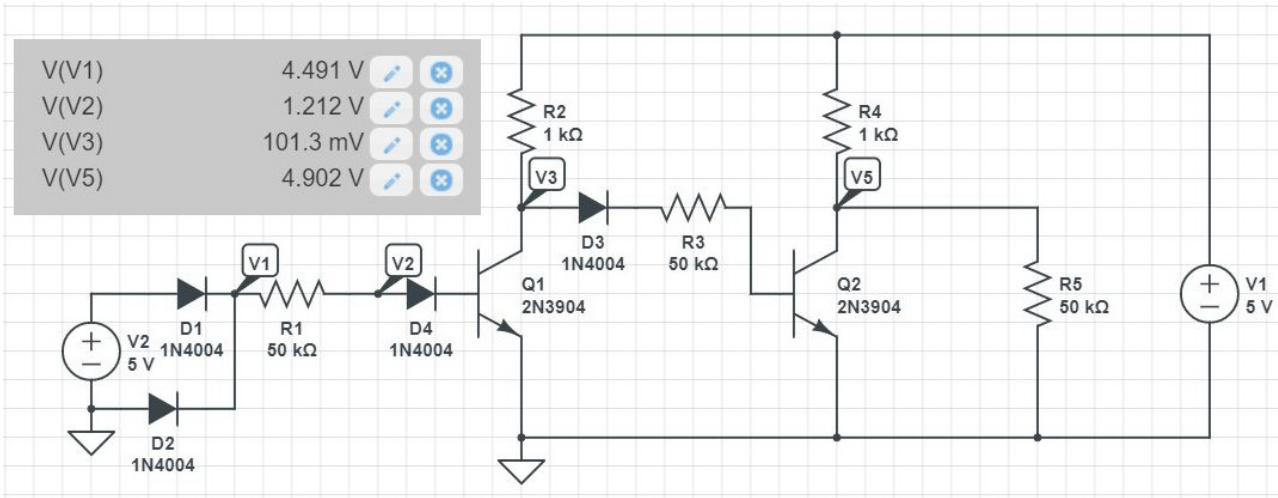
1) Determine the voltages and currents for the following DTL OR gate. Assume 3904 NPN transistors



Start with determining which voltages along with the state of the diodes and transistors. Then find the currents

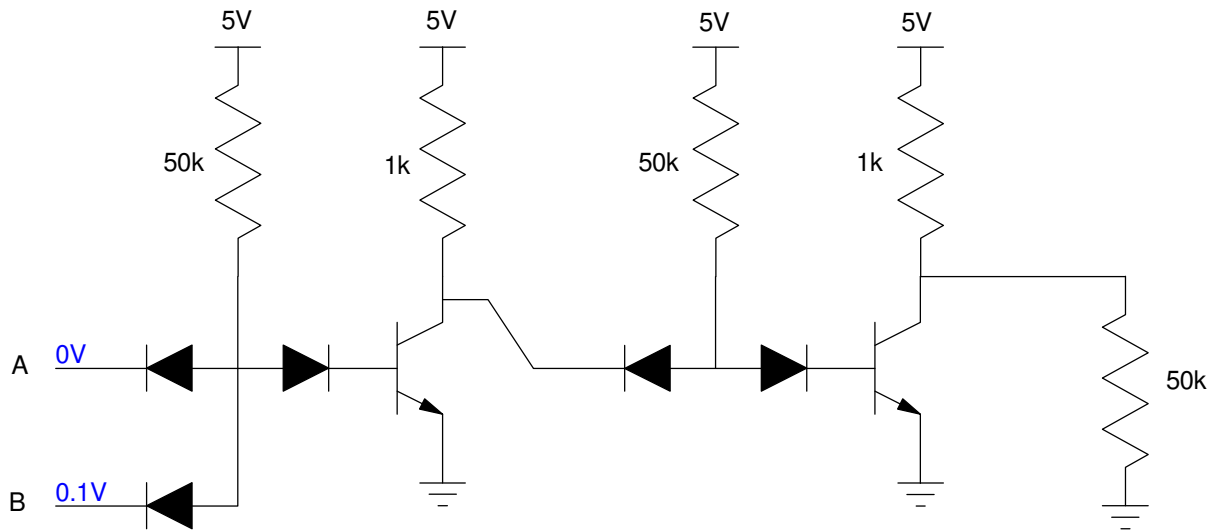


2) Simulate this circuit in CircuitLab to verify your answers

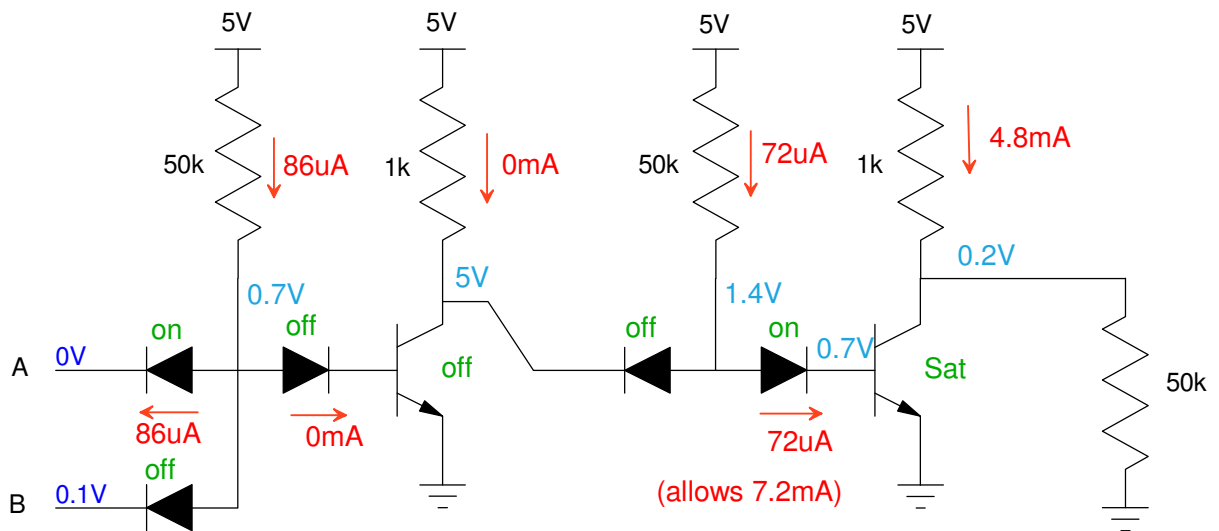


	V1	V2	V3	V5
Calculated	4.300V	1.400V	200mV	4.902V
Simulated	4.491V	1.212V	101mV	4.902V

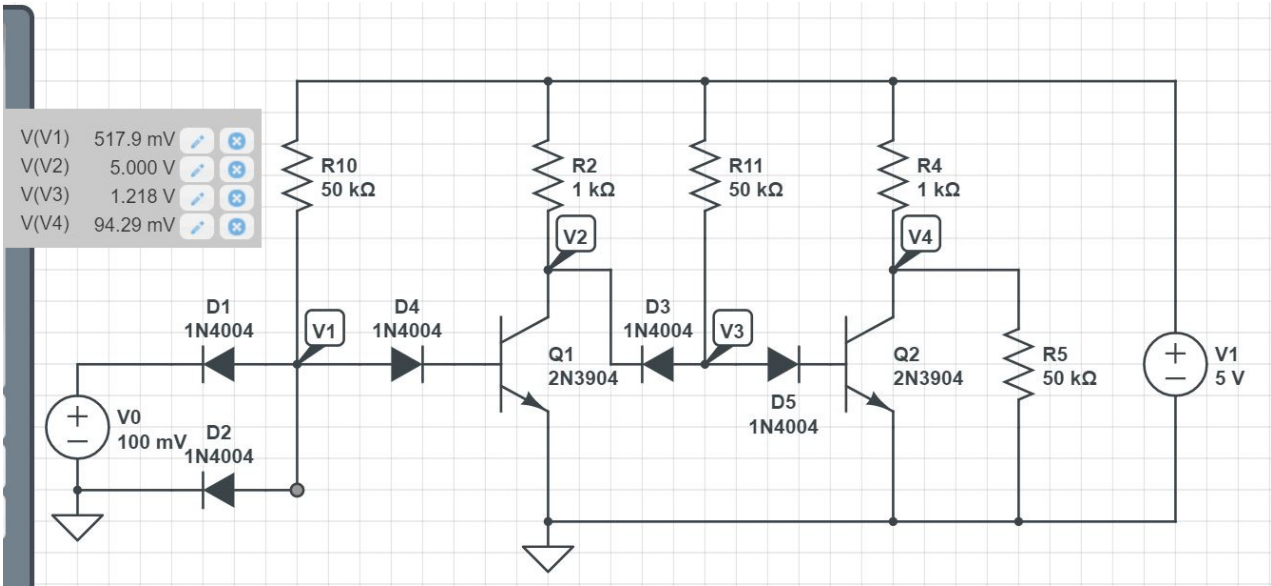
3) Determine the voltages and currents for the following DTL AND gate. Assume 3904 NPN transistors



Determine the voltages then currents



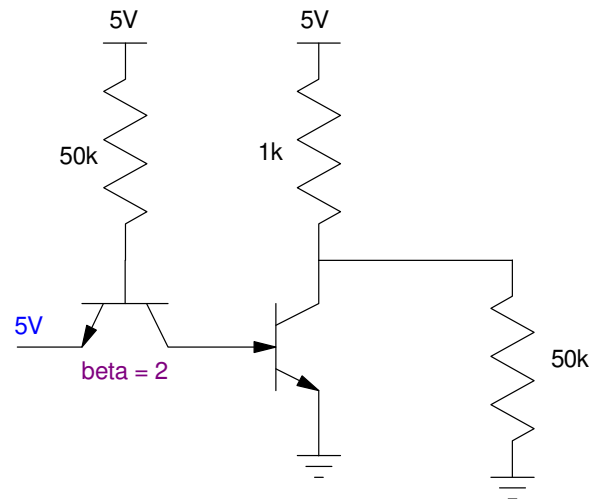
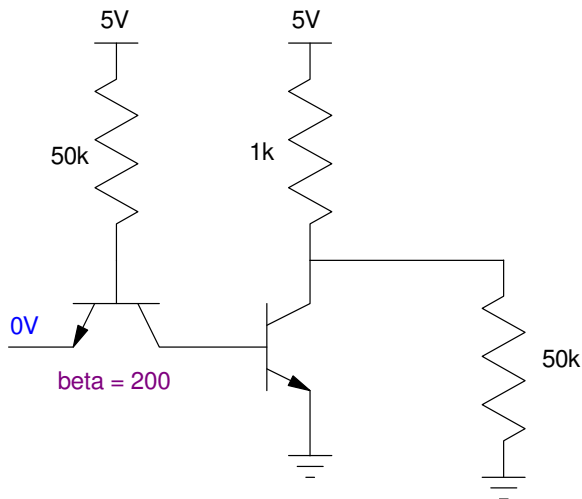
4) Simulate this circuit in CircuitLab to verify your answers



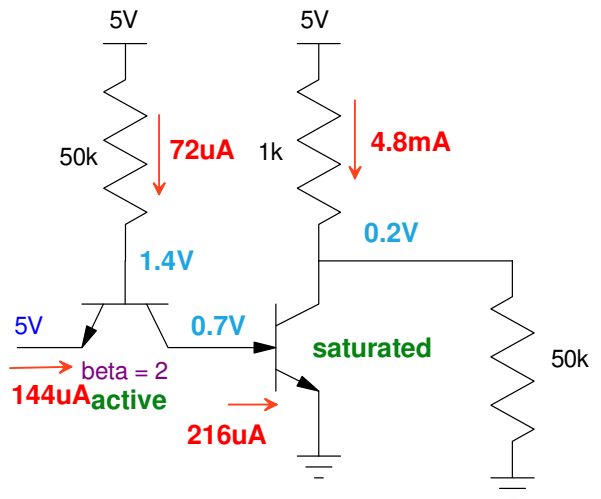
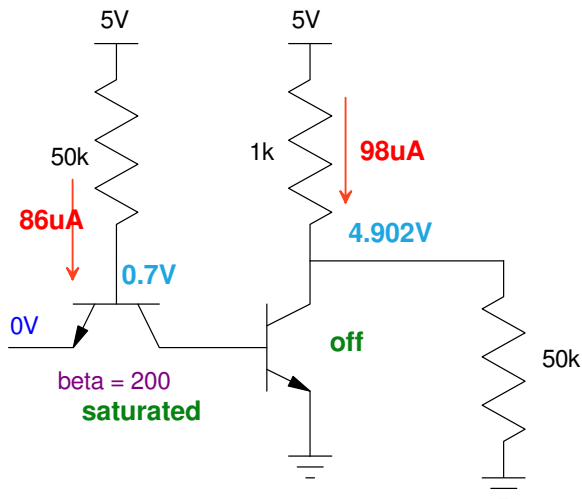
	V1	V2	V3	V4
Calculated	0.7000V	5.000V	1.400V	0.2000V
Simulated	0.5179V	5.000V	1.128V	0.0929V

TTL Logic

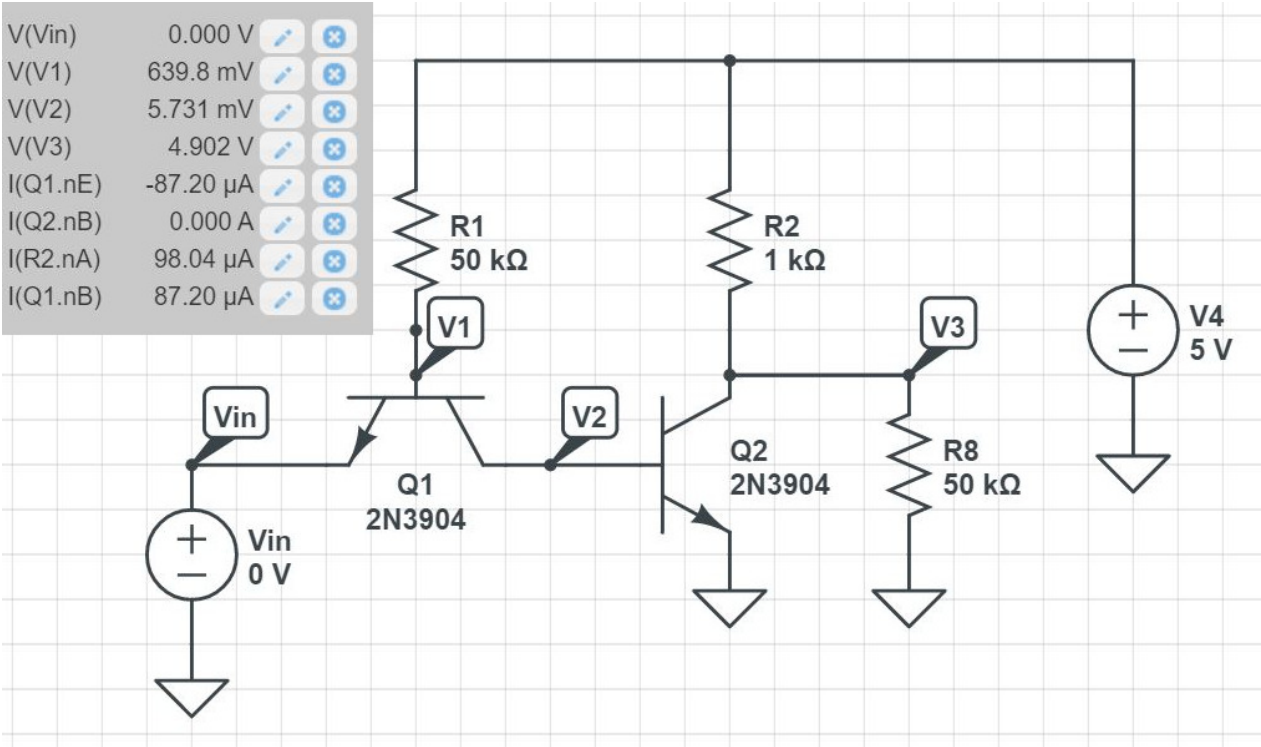
5) Determine the voltages for the following TTL inverter. Assume 3904 transistors.



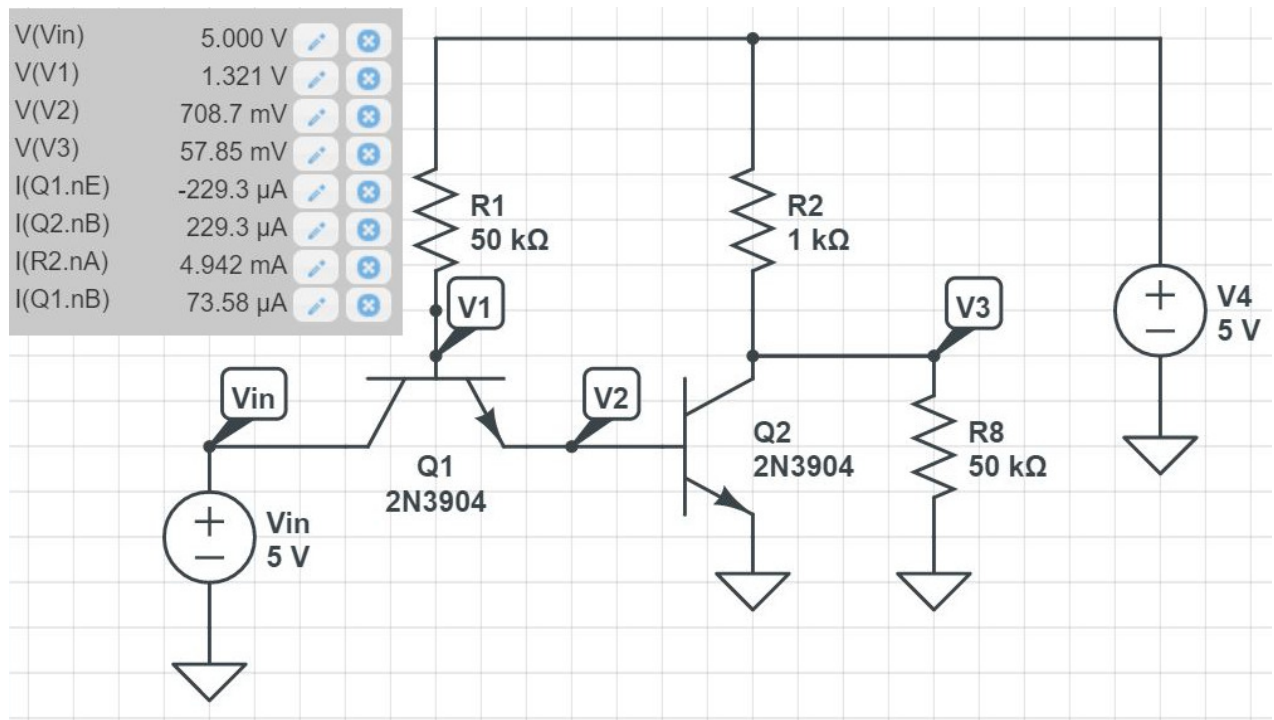
Determine the voltages then currents



) Simulate these circuits in CircuitLab to verify your answers



	V1	V2	V3	I(in)
Calculated	0.7000V	0.0000V	4.902V	-86.00uA
Simulated	0.6398V	0.0057V	4.902V	-87.2uA



	V1	V2	V3	I(in)
Calculated	1.400V	0.7000V	0.2000V	144uA
Simulated	1.321V	0.7087V	0.0578V	87.74uA

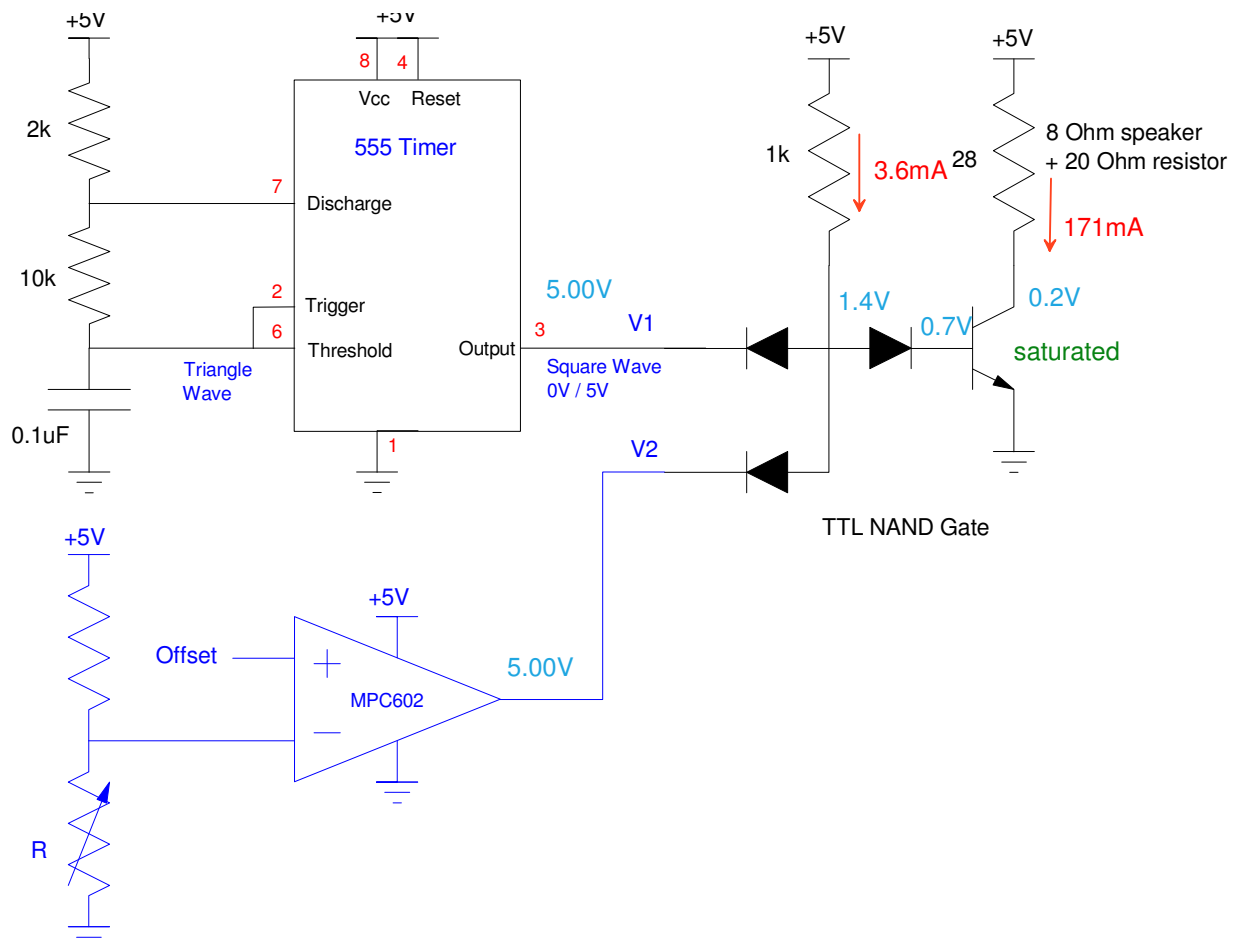
Temperature Alarm using DTL Logic

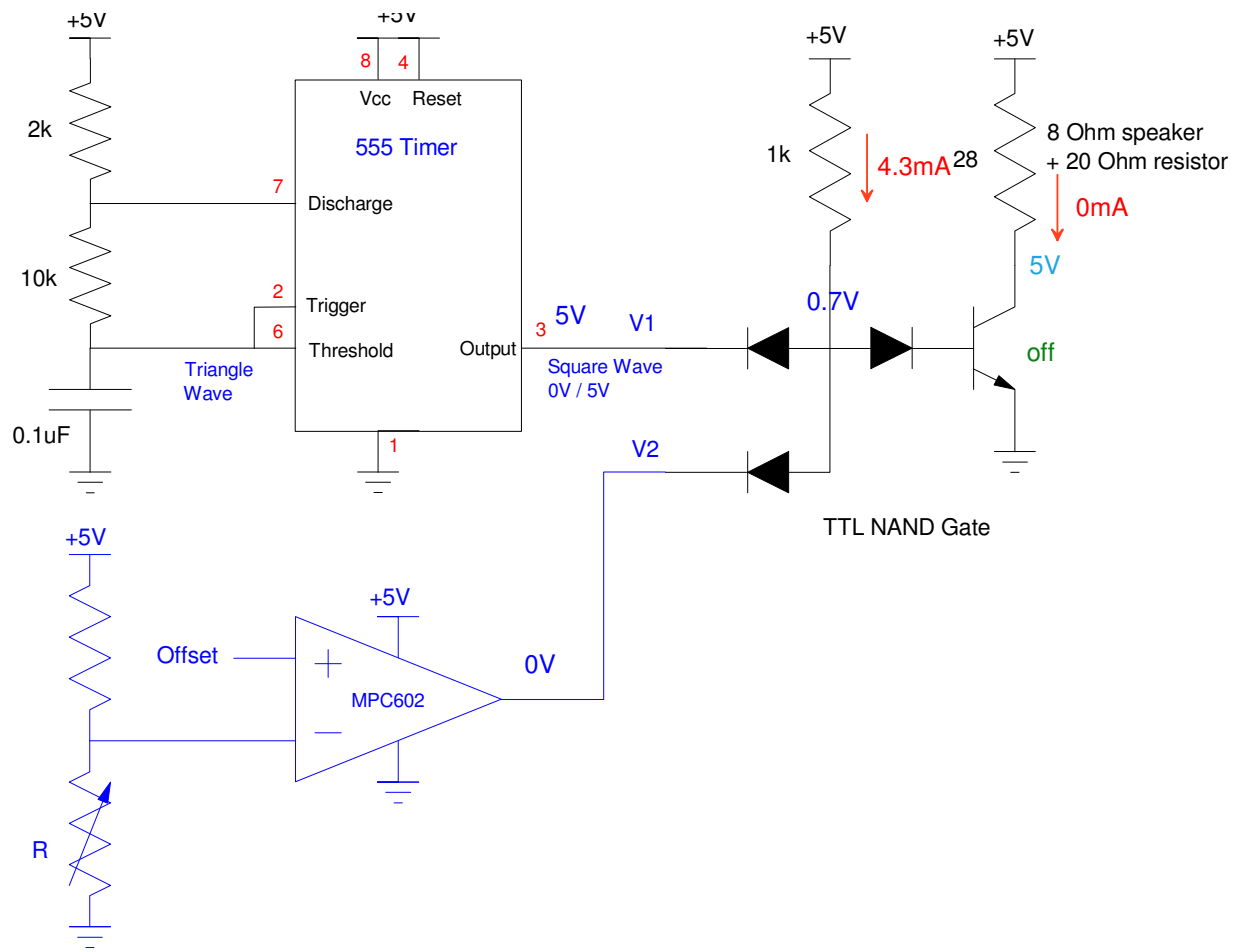
The circuit below uses a DTL NAND gate to drive the speaker when

- The 555 timer outputs 5V, and
- The comparator outputs 5V,.

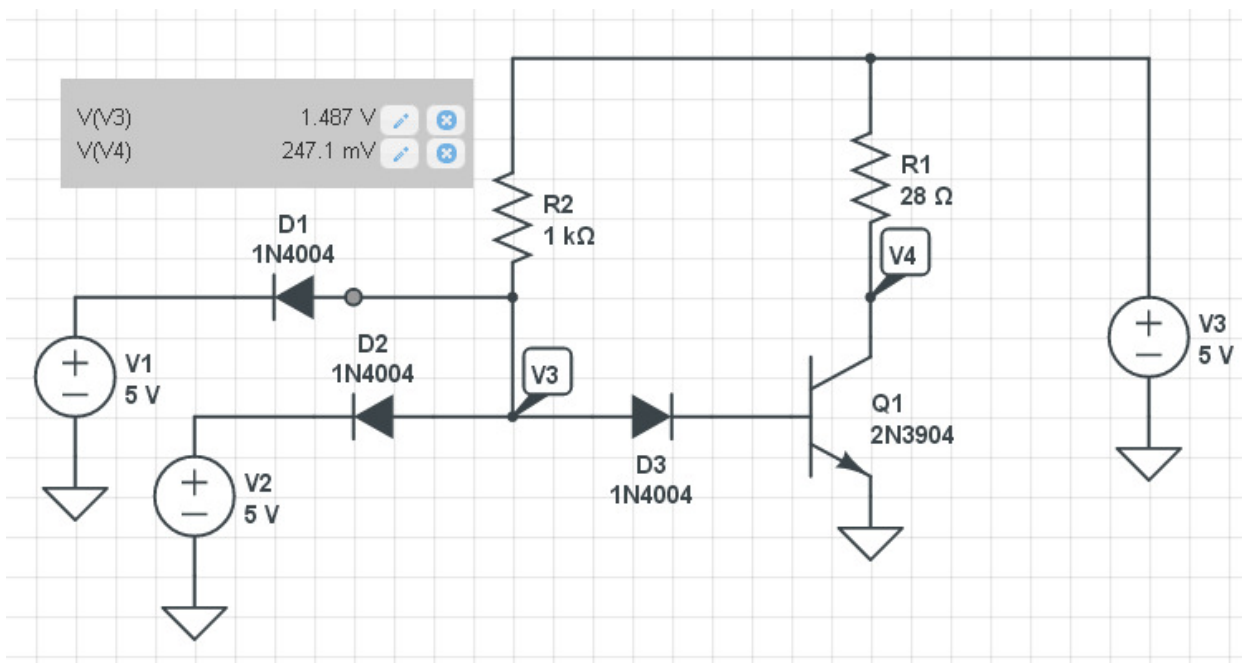
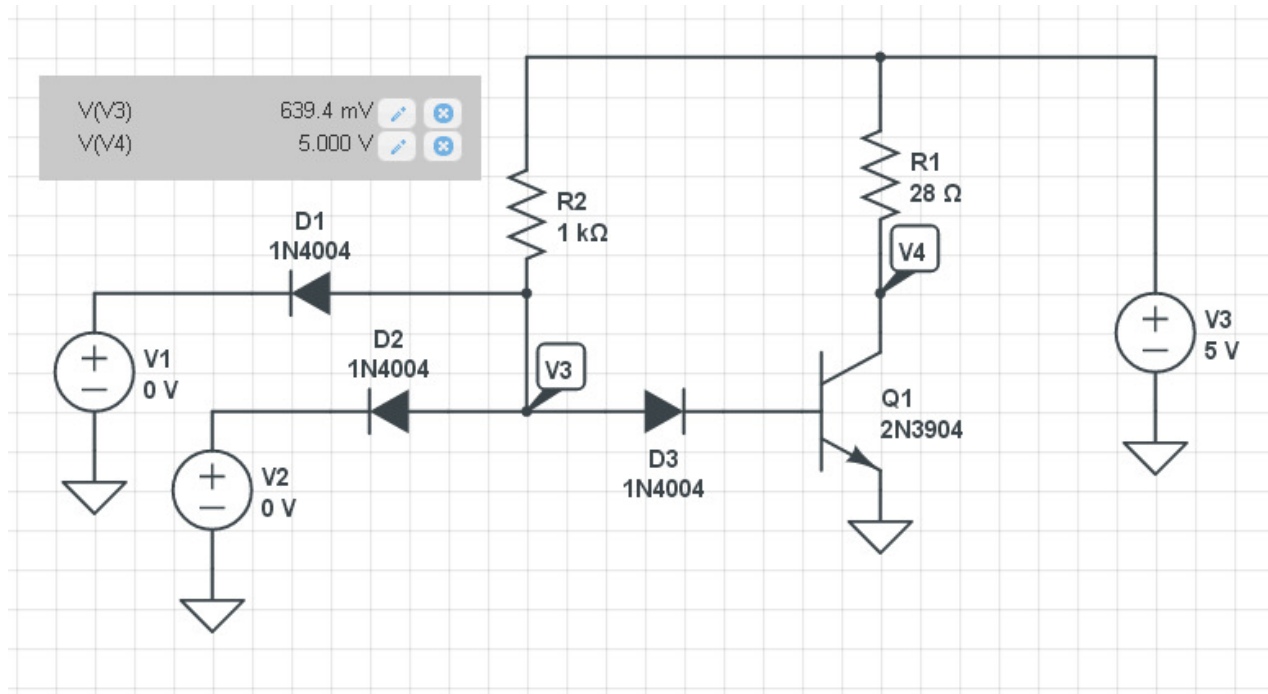
7) Determine the voltages when

- $V_1 = V_2 = 0V$
- $V_1 = V_2 = 5V$
- $V_1 = 0V, V_2 = 5V$
-

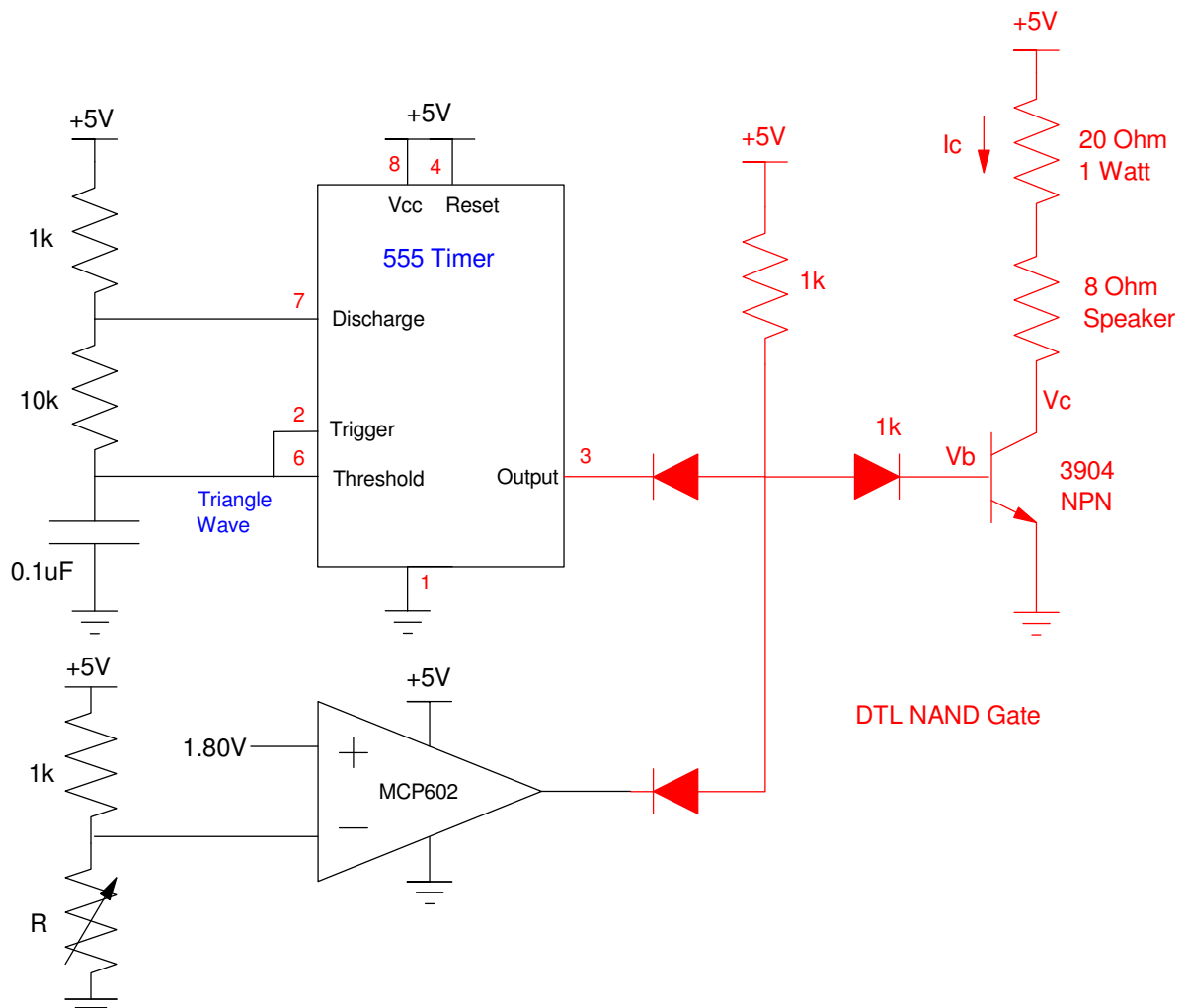
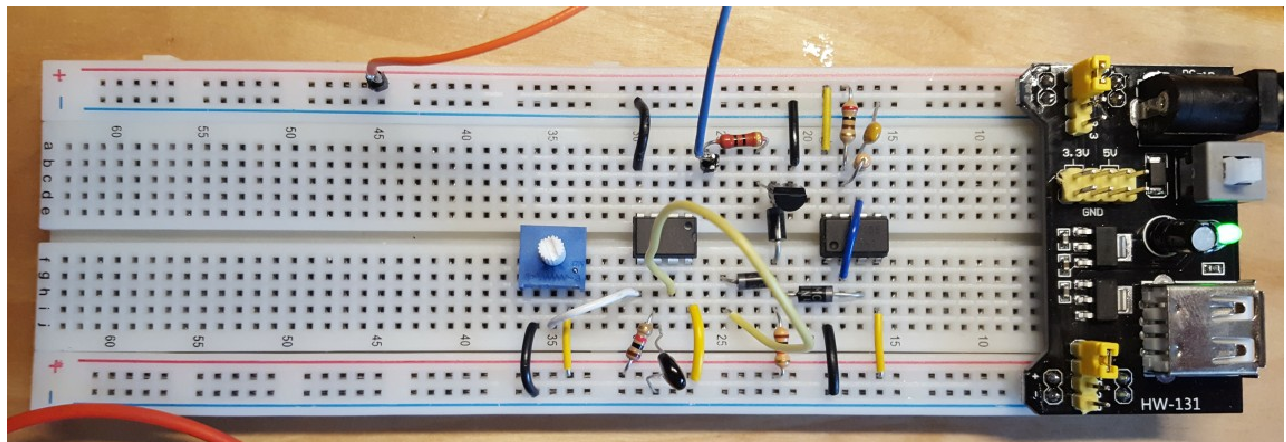




8) Verify your design using CircuitLab.



Lab: 9) (20pt): Verify your design in hardware (build and test the circuit with your lab kit).



- The 555 timer from homework set #5 for V1, and
- Connecting the comparator from homework set #5 for V2

Verify that

- The speaker turns on when $T > T_{on}$ and
- The speaker turns off when $T < T_{on}$

Setting the comparator to turn on at 1.80V

- Speaker turns on when $V_r < 1.80V$
- Speaker turns off when $V_r > 1.83V$

