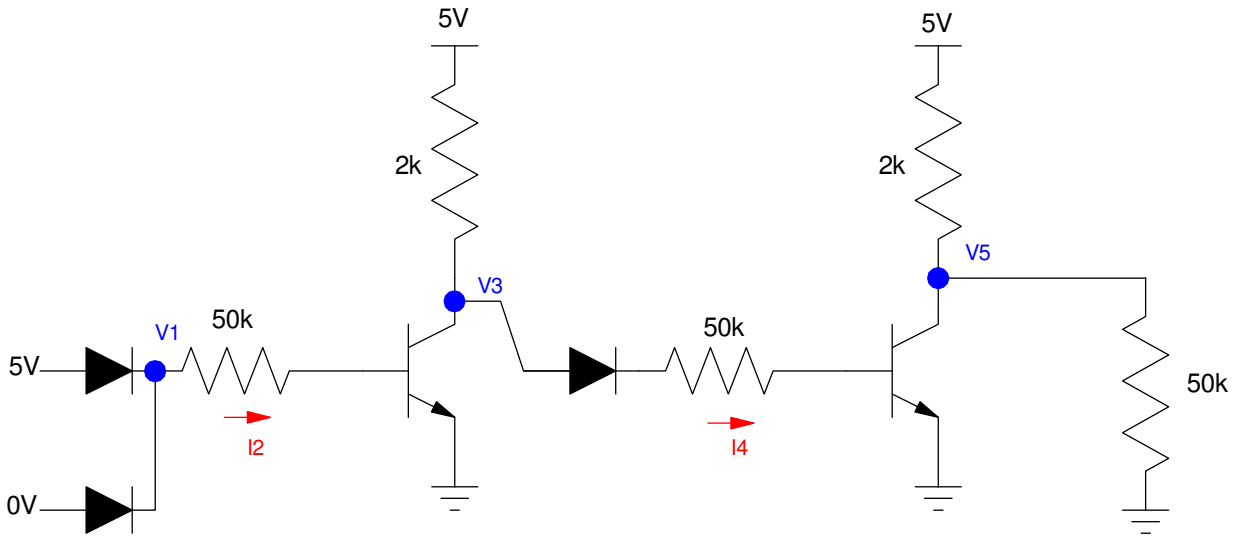
ECE 320 - Homework #8

DTL, TTL Logic, MOSFETs. Due Monday, October 18th

DTL Logic

1) Determine the voltages and currents for the following DTL OR gate

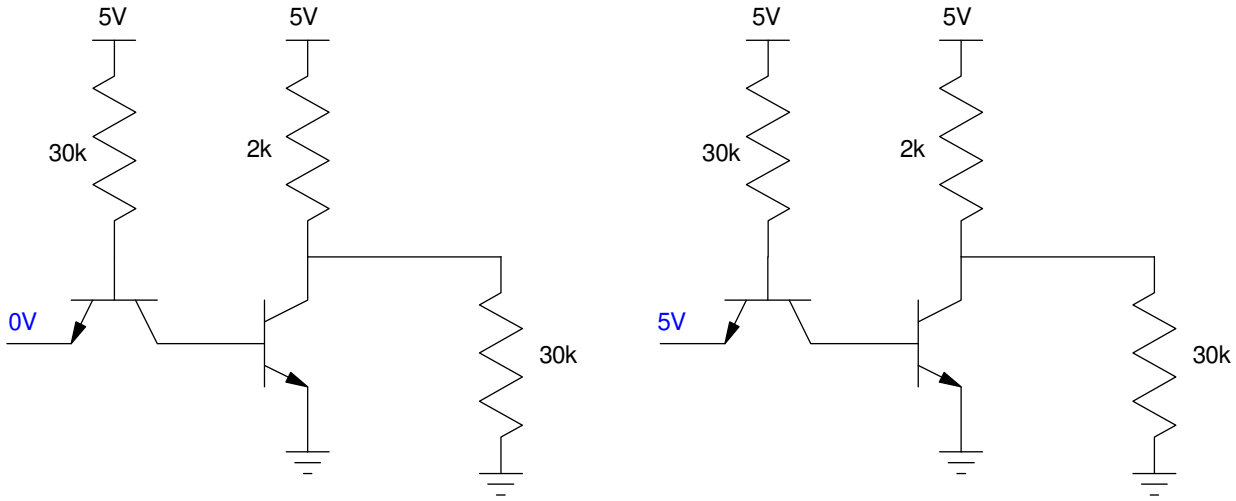
2) Simulate this circuit in CircuitLab to verify your answers for problem #3



TTL Logic

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

4) Simulate these circuits in CircuitLab and determine the voltage and currents



Temperature Alarm using DTL Logic

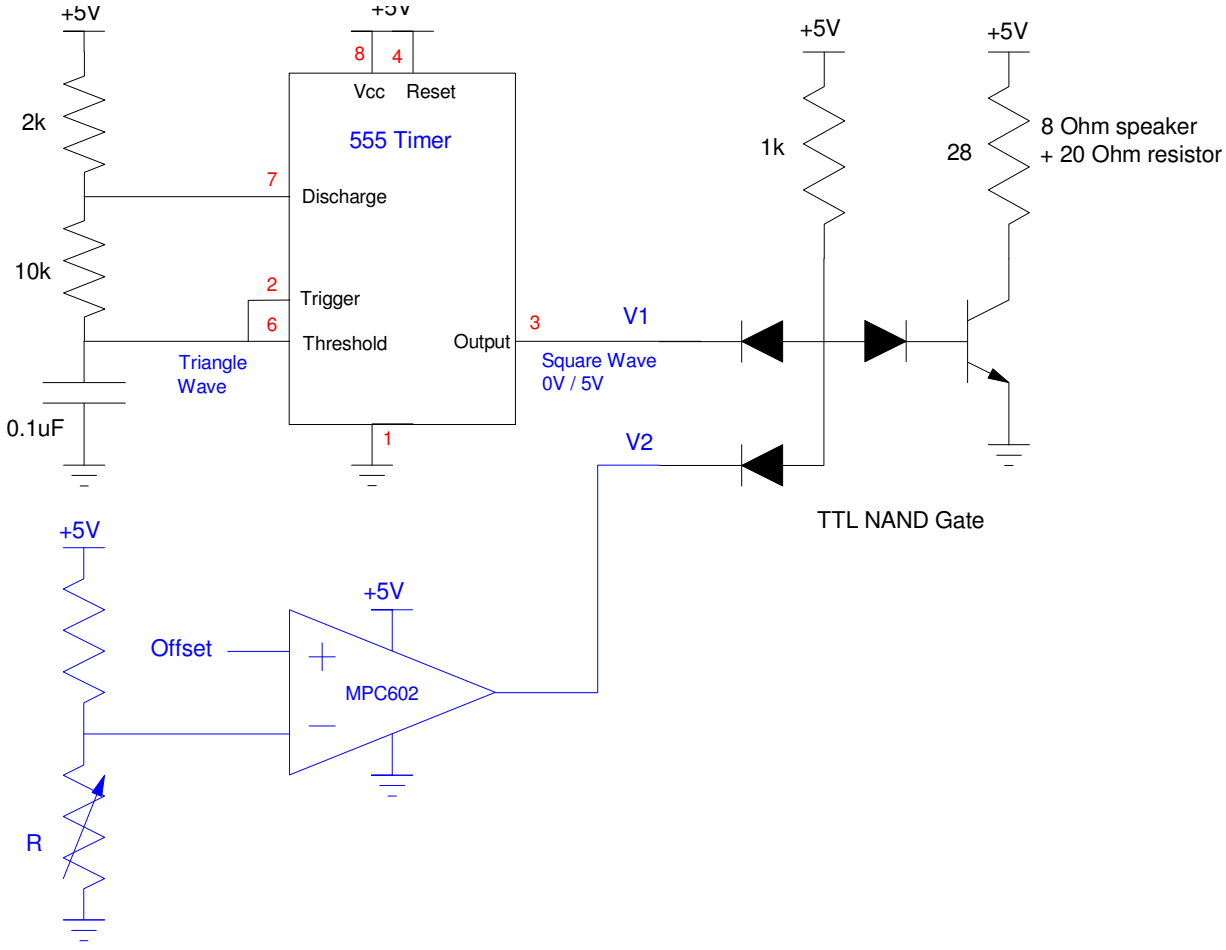
The circuit below uses a DTL NAND gate to drive the speaker when

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

5) Determine the voltages when
   - V1 = V2 = 0V
   - V1 = V2 = 5V
   - V1 = 0V, V2 = 5V
6) Verify your design using CircutiLab.

Lab: 7) (20pt): Verify your design in hardware (build and test the circuit with your lab kit).

- note: Use a potentiometer to simulate the temperature sensor.



MOSFET

8) Label the operating regions on the graph below (off, ohmic, saturated) and determine the transconductance gain, kn. Assume the turn-on voltage is Vt = 1.00V

9) Draw the load line for the circuit below. From the load line, determine the operating point (Vds, Ids) when

- Vg = 2V
- Vg = 7V

10) Calculate the operating point (Vds, Ids) when

- Vg = 2V
- Vg = 7V.