1) 555 Multi vibrator 4 pts
   a) Plot the voltage at node 2 for the first 4 seconds after power is applied to the circuit. Assume that the initial capacitor voltage is zero. 1 pt.
   b) Plot the internal S and R nodes of the timer. 2 pts.
   c) What is the approximate on and off times of the LED. 1 pt

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2) MONOSTABLE MULTIVIBRATOR with 555 TIMER
   On a single page plot V1 and V0 with nodes 2 and 6 for the following circuit:
   Show all times, time constants and voltages for the waveforms.
3) 555 Timer Circuit
   Plot for two cycles, the following node voltages:
   a) 2, 1 pt  b) R, 1 pt  c) S, 1 pt  d) Vo, 1 pt
   e) Determine the duty cycle of the output waveform 1 pt.

4) 555 Timer
   Plot for 500 uS of time: VC1, V3, VC2 vs time.
   Show voltages, times and times constants.
5) ASTABLE MULTIVIBRATOR with 555
   a) What is the flash rate for the LED. 2 pts
   b) Plot Vca vs time for 2 cycles showing times and voltage values and curve shapes. 2 pts
   c) Plot Vo (on the same time scale) 1 pt
555 ASTABLE MULTIVIBRATOR

The following circuit is designed to produce a 2 kHz square wave with a 66.7% duty cycle.

a) Find R1 and R2 if C1 = 4000 pF. 2 pt
b) Showing voltage levels, times and time constants plot the voltage across the capacitor, VCl. 2 pt.

The switch is normally OPEN, after 10 us the switch is CLOSED for 10 us and then OPENED again. Demonstrate the operation of the circuit by:

a) Plotting on the same page VBE1, VCE1, VBE2, VCE2, 3 pts
b) After what length of time of keeping the switch closed will the state of the flip-flop be unpredictable. 1 pt
55 TIMER CIRCUIT 4 pts
C. Use the switch then plot for two cycles the following node voltages:
a) Node 2;  b) S;  c) R;
d) Vo showing period and duty cycle

Vo' (max) = 9 V
Vo' (min) = 0 V

PIN 8 POWERS WHOLE 555 TIMER CKT!
2) 555 TIMER CIRCUIT 6 pts.
At To, S is closed and held closed for 50 mS then opened.
Plot for 110 mS the node voltages at nodes: 12, 13, 16, 22, 23, 27. SHOWING:
all voltage levels, times, FWS, spaces and time constants. 1 pt each node
C1=C2=C3=1uF; R1=10ohm, R2=10K, R3=90K, R4=10K, R5=100ohm, R6=40K
APPROXIMATE THE TIMES AND TIME CONSTANTS + or - 10%