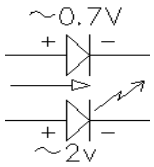
Name:_____ ECE 2100 homework # 10 Due: Fri, 2/14/03

A.Stolp
2/13/01,
2/15/03

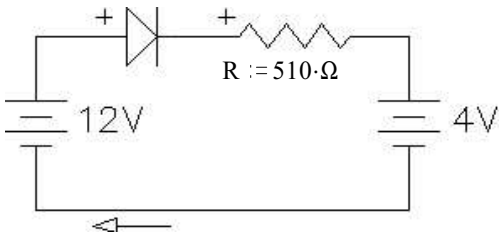
Fill in the blanks in the following circuits. Since these calculations are very simple, you may simply write down the answer without showing work.

Assume the diodes are silicon with a 0.7V forward voltage drop:



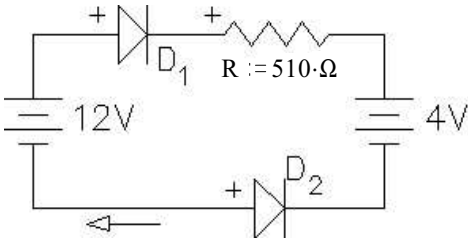

Assume the LEDs have a 2V forward voltage drop:

1. $V_D$= _____ $V_R$ = _____



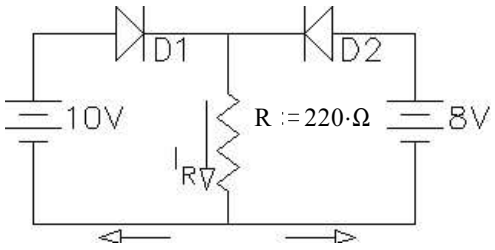

I = _____

2. $V_{D1}$ = _____ $V_R$ = _____



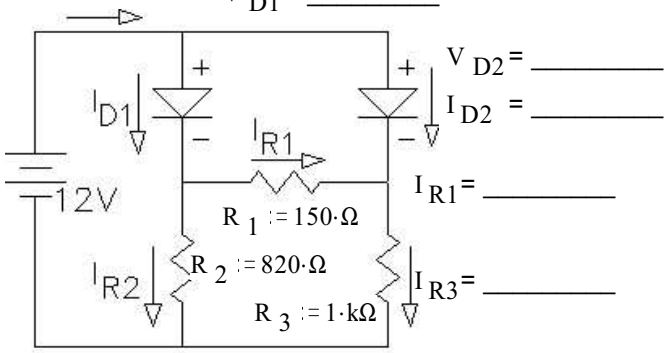

I = _____ $V_{D2}$ = _____

3. $V_{D1}$ = _____ $V_{D2}$ = _____




$I_1$ = _____ $I_2$ = _____

4. $I_T$= _____ $V_{D1}$ = _____




$V_{D2}$ = _____

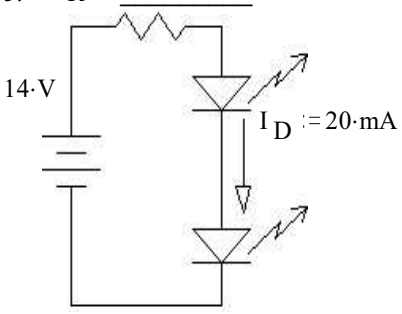
$I_{D2}$ = _____

$I_{R1}$ = _____

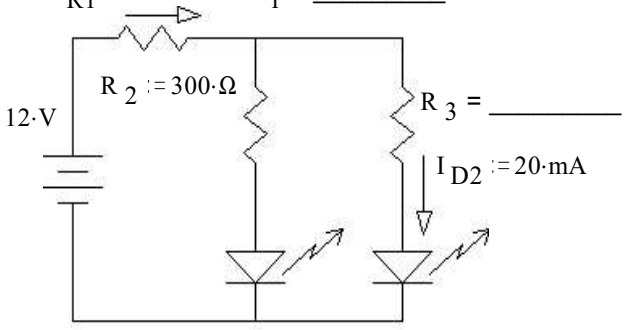
$I_{R3}$ = _____

$I_{R2}$ = _____

5. R = _____

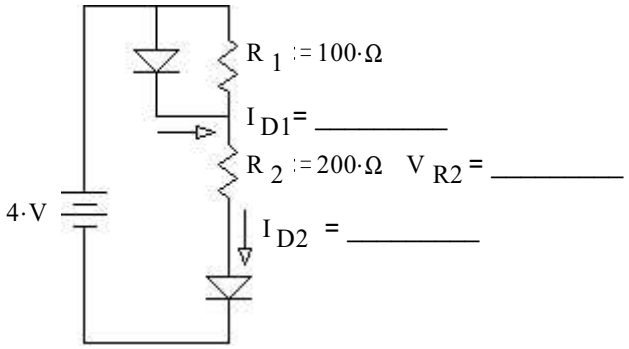



6. $I_{R1}$ := 30·mA $R_1$ = _____

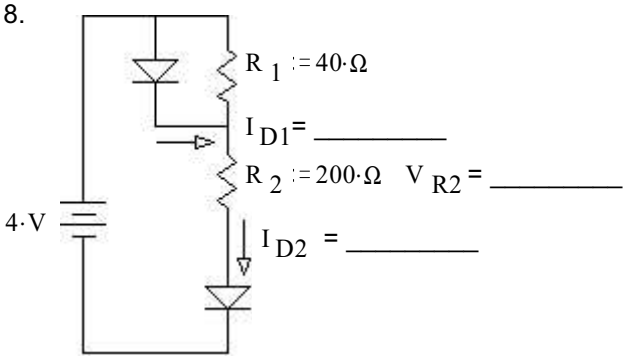


 You may need to attach paper with calculations for the remaining problems

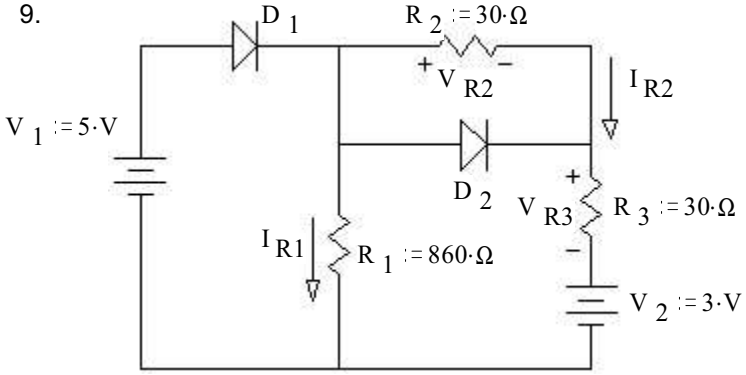
7.




8.




9.



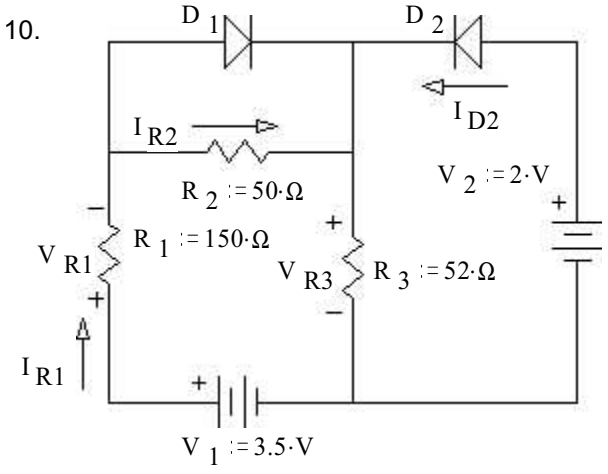

$I_{R1}$= _____

$I_{R2}$= _____

$V_{R2}$ = _____

$V_{R3}$ = _____

10.




$V_{R2}$ = _____

$V_{R3}$ = _____

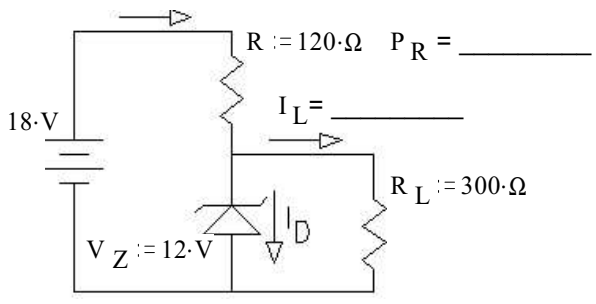
$I_{R2}$= _____

$I_{D1}$= _____

$I_{D2}$= _____

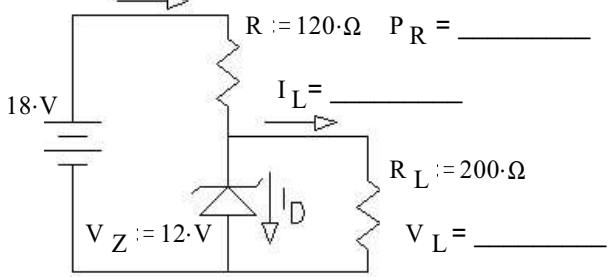
11. neglect $r_Z$ in this and the next problem

$I_R$= _____



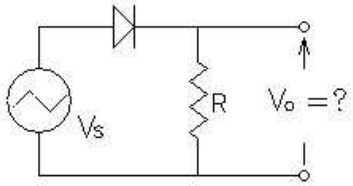

$I_D$= _____ $P_D$ = _____

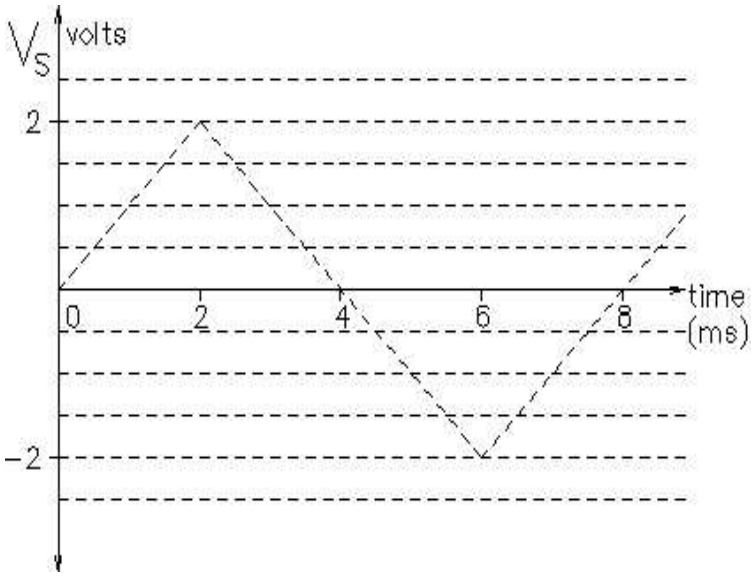
12. $I_R$= _____



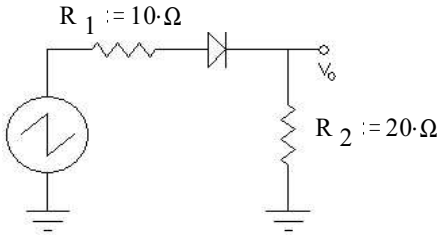

$I_D$= _____ $P_D$ = _____

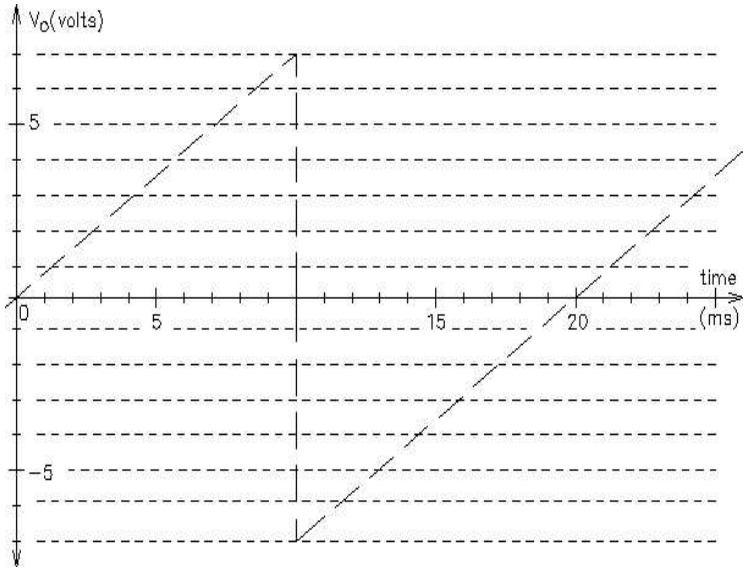
13. The input voltage to the circuit below is shown at right (dotted line). Show the output voltage across the resistor. Make it accurate and label the important voltages **and** times.



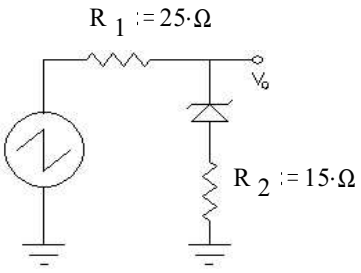



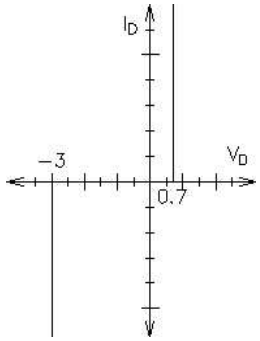

14. The voltage waveform shown at right (dotted line) is applied to the circuit shown below. Accurately draw the output voltage you expect to see across the 20Ω resistor. Label the important voltages **and** times.



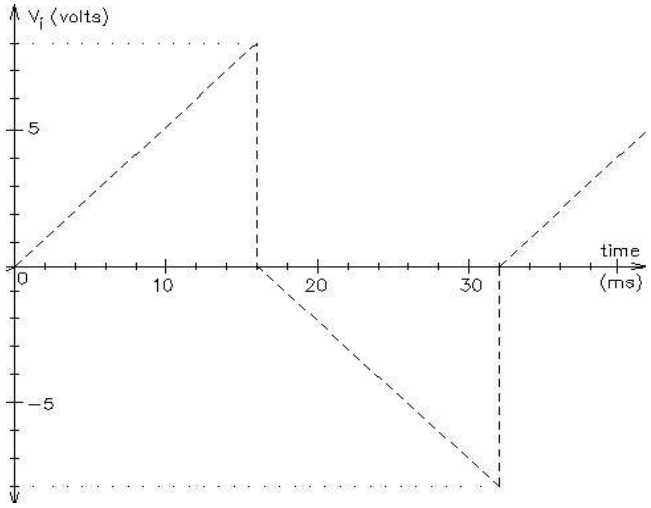



15. The voltage waveform shown at right is applied to the circuit shown below Accurately draw the output voltage ($v_o$) you expect to see. The characteristic curve for the 3-V silicon zener diode is also shown. Label important times **and** voltage levels.



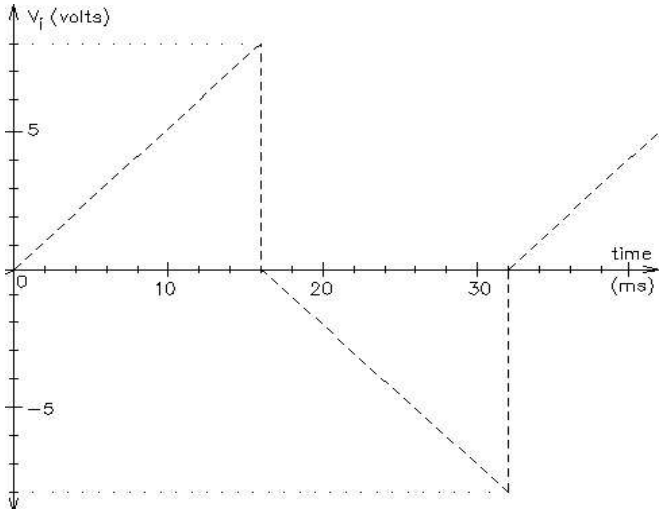




neglect $r_Z$




16. Repeat problem 15 with an $r_Z$ of 5 Ω. Vzo = 3V

    $r_d$ = 5 Ω in forward direction




**Answers**

1. $V_D := 0.7\cdot V$ $V_R := 7.3\cdot V$ $I := 14.3\cdot mA$
2. $I := 0\cdot mA$ $V_{D2} := -8\cdot V$ $V_{D1} := 0\cdot V$ $V_R := 0\cdot V$
3. $V_{D1} := 0.7\cdot V$ $V_{D2} := -1.3\cdot V$ $I_1 := 42.3\cdot mA$ $I_2 := 0\cdot mA$
4. $V_{D1} := 0.7\cdot V$ $V_{D2} := 0.7\cdot V$ $I_{R1} := 0\cdot mA$ $I_{R2} := 13.8\cdot mA = I_{D1}$ $I_{R3} := 11.3\cdot mA = I_{D2}$ $I_T := 25.1\cdot mA$
5. $R := 500\cdot\Omega$
6. $R_1 := 233\cdot\Omega$ $R_3 := 150\cdot\Omega$
7. $V_{R2} := 2.6\cdot V$ $I_{D2} := 13\cdot mA$ $I_{D1} := 6\cdot mA$
8. $I_{D1} := 0\cdot mA$ $I_{D2} := 13.75\cdot mA$ $V_{R2} := 2.75\cdot V$
9. $I_{R1} := 5\cdot mA$ $I_{R2} := 21.7\cdot mA$ $V_{R2} := 0.65\cdot V$ $V_{R3} := 0.65\cdot V$
10. $V_{R2} := 11\cdot mA$ $V_{R3} := 1.3\cdot V$ $I_{R2} := 11\cdot mA$ $I_{D1} := 0$ $I_{D2} := 14\cdot mA$
11. $I_L := 40\cdot mA$ $I_R := 50\cdot mA$ $I_D := 10\cdot mA$ $P_R := 0.3\cdot W$ $P_D := 0.12\cdot W$
12. $I_D := 0\cdot mA$ $I_L = I_R := 56.3\cdot mA$ $V_L := 11.3\cdot V$ $P_R := 0.38\cdot W$ $P_D := 0\cdot W$
13. Straight lines between the following points: (0ms,0V), (0.7ms,0V), (2ms,1.3V), (3.3ms,0V), (8.7ms,0V), then ramps up as between 0.7ms & 2ms
14. Straight lines between the following points: (0ms,0V), (1ms,0V), (10ms,4.2V), (10ms,0V), (21ms,0V), then ramps up as between 0.7ms & 10ms
15. Straight lines between the following points: (0ms,0V), (6ms,3V), (16ms,4.875V), (16ms,0V), (17.4ms,-0.7V), (32ms,-3.438V), (32ms,0V), (38ms,3V), then ramps up as between 6ms & 16ms.
16. Straight lines between the following points: (0ms,0V), (6ms,3V), (16ms,5.222V), (16ms,0V), (17.4ms,-0.7V) (32ms,-3.944V), (32ms,0V), (38ms,3V), then ramps up as between 6ms & 16ms.