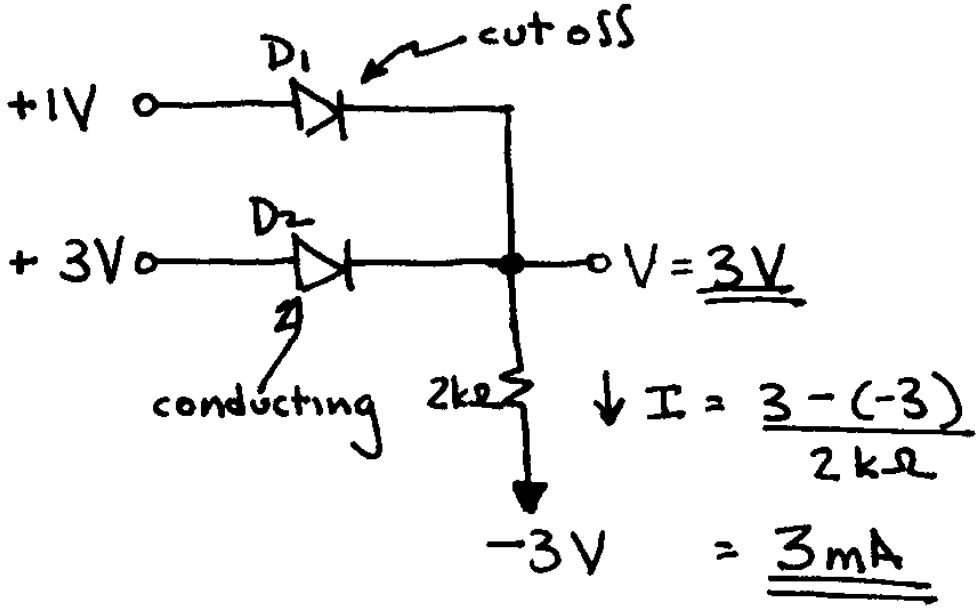
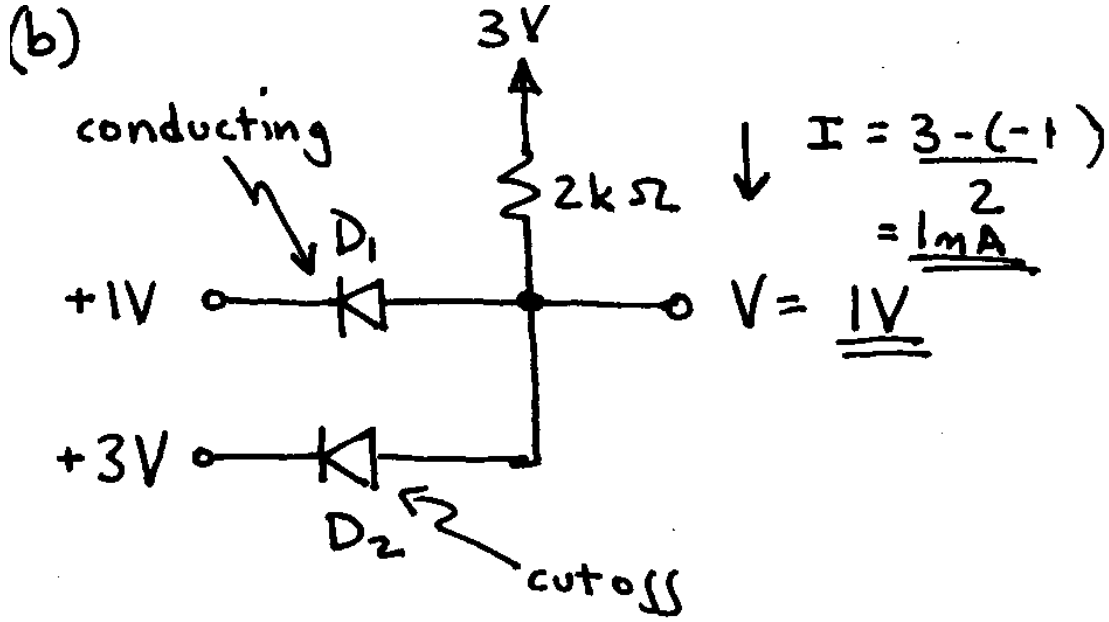
HW1

3.3

(a)

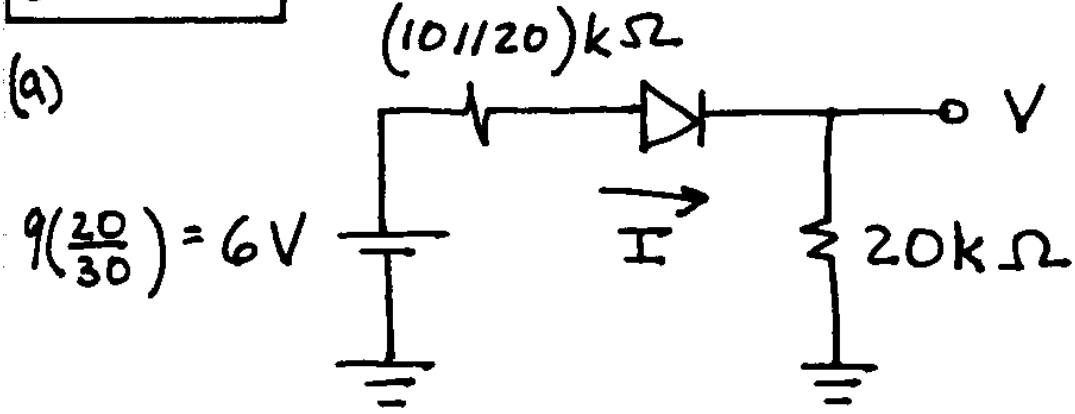

D1
cut off
+1V
D2
+3V
V = 3V
conducting
2kΩ
I = 3 - (-3) / 2kΩ
-3V
= 3mA

(b)


3V
conducting
2kΩ
I = 3 - (-1) / 2
= 1mA
D1
+1V
V = 1V
+3V
D2
cut off

3.10

(a)

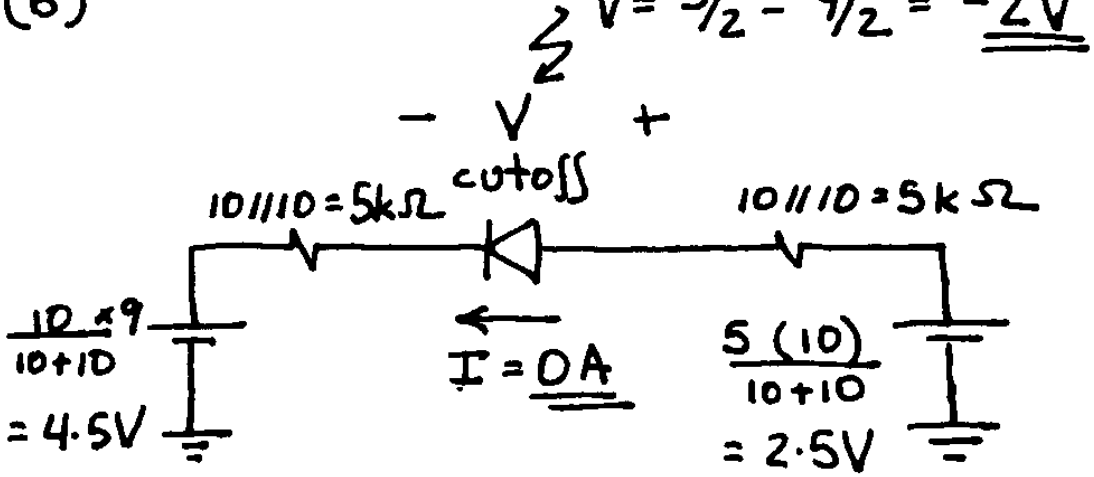


$$I = \frac{6}{(10//20)+20} = \underline{0.225mA}$$

$$V = \frac{20}{(10//20)+20} \times 6 = \underline{4.5V}$$

(b)

$V = 5/2 - 9/2 = \underline{-2V}$



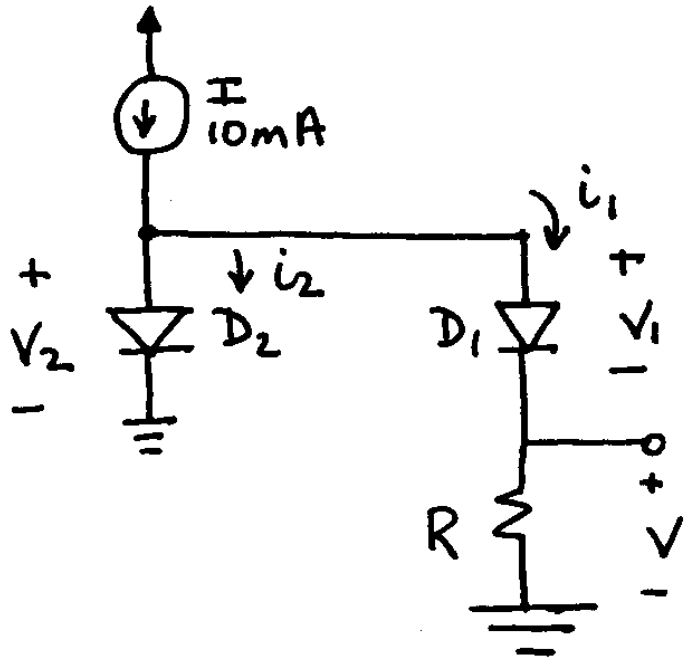
3.11

$$R \gg \frac{120\sqrt{2}}{50} \gg \underline{\underline{3.4\,k\Omega}}$$

The largest reverse voltage appearing across the diode is equal to the peak input voltage

$$120\sqrt{2} = \underline{\underline{169.7\,V}}$$

3.26



Given for each diode

$i = I_S e^{V/nV_T} \Rightarrow 10\times10^{-3} = I_S e^{0.7/n \times 0.025}$ ①

$100\times10^{-3} = I_S e^{0.8/n\times0.025}$ ②

②/① $10 = e^{0.1/n(0.025)}$

$n = 1.737$

$V = V_2 - V_1 = nV_T \ln(i_2/i_1) = 80mV$

$1.737(25\times10^{-3}) \ln\left(\frac{0.01 - i_1}{i_1}\right) = 80$

$i_1 = 1.4\,mA$

$R = 80/i_1 = 80/1.4 = \underline{57.1\Omega}$