3.3
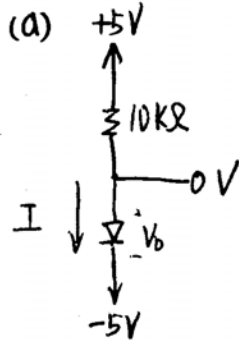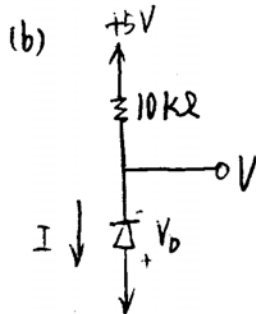
(a)

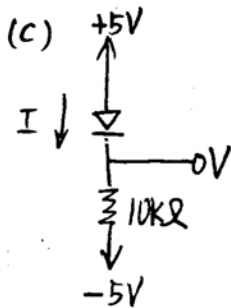Diode is on $\Rightarrow V_D = 0$

Thus $V = -5V$

$$I = \frac{5-(-5)}{10k\Omega} = 1mA$$

(b)

Diode off

Thus $I = 0$

$V = 5V$

(c)
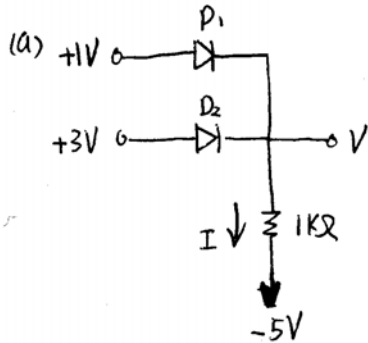

Diode on

$V = 5V$

$$I = \frac{5-(-5)}{10k\Omega} = 1mA$$
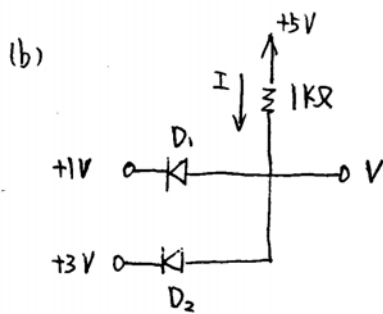
(d)

Diode off

$I = 0$

$V = -5V$

3.4

(a) +1V ○—▷|—•P_1

D_2
+3V ○—▷|—○ V

$I \downarrow$ ⧨ 1KΩ

↓ −5V
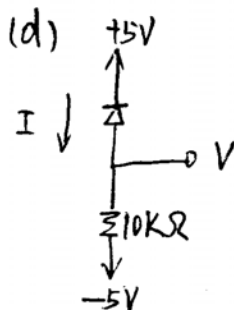
D_1 off D_2 on

$V = 3V$

$I = \dfrac{3 - (-5)}{1K\Omega} = 8mA$

(b)

+5V ↑

$I \downarrow$ ⧨ 1KΩ

D_1
+1V ○—|◁—○ V

+3V ○—|◁—
D_2

D_1 on D_2 off

$V = 1V$

$I = \dfrac{5 - 1}{1K\Omega} = 4mA$

3.9

+10V ↑

(a)

$I_2 \downarrow$ ⧨ 5KΩ

$I \downarrow$ ▽|D_1 ▽|D_2
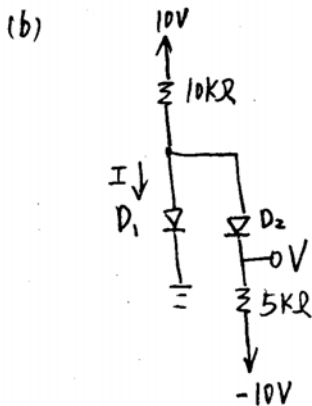—○ V

⧨ 10KΩ

I_1 ↓ −10V
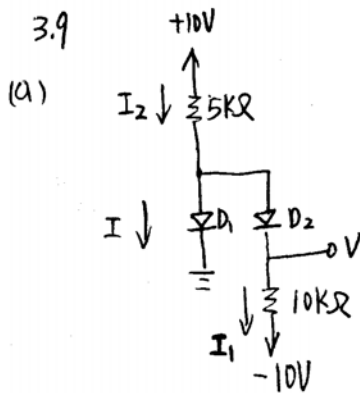
D_1 D_2 both on

$V = 0V$

$I_2 = \dfrac{10V}{5K\Omega} = 2mA$

$I_1 = \dfrac{0V - (-10)V}{10K\Omega} = 1mA$

$I = I_2 - I_1 = 1mA$

(b)

10V ↑

⧨ 10KΩ

$I \downarrow$
D_1 ▽| ▽| D_2
—○ V

⧨ 5KΩ

↓ −10V

D_1 off D_2 on

$\dfrac{10 - V}{10K} = \dfrac{V - (-10)}{5K}$

$\Rightarrow V = -3.33 V$

$I = 0$

3.10

(a)
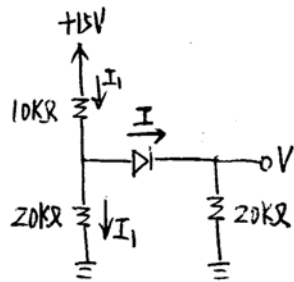
Diode on
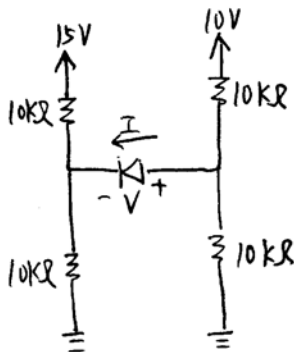
$$V = 15V \cdot \left(\frac{20K\Omega // 20K\Omega}{10K\Omega + 20K\Omega // 20K\Omega} \right) = 7.5\ V$$

$$I_1 = \frac{7.5V}{20K\Omega} = 0.375\ mA$$

$$I_2 = \frac{15V - 7.5V}{10K\Omega} = 0.75\ mA$$
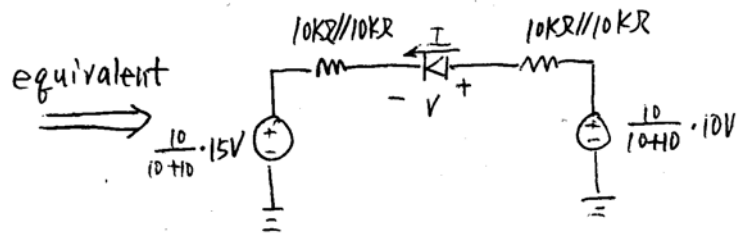
$$I = I_2 - I_1 = 0.375\ mA$$

(b)

equivalent $\Rightarrow$

Diode off $\Rightarrow$ $I = 0$

$$V = \frac{10}{10+10}\ 10V - \frac{10}{10+10}\ 15V$$

$$= -2.5V$$