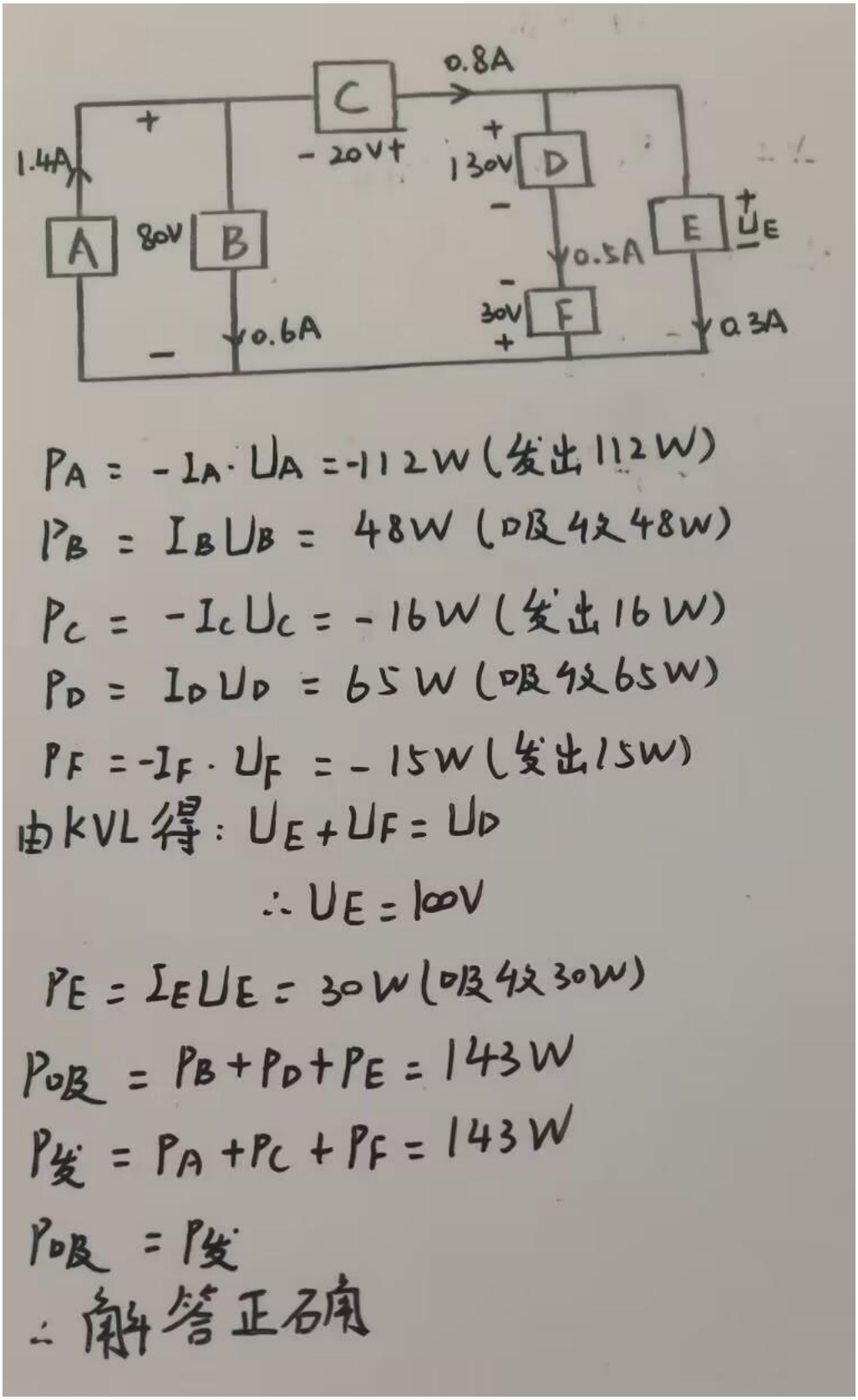
电路作业（一）

1—4



$P_A = -I_A \cdot U_A = -112W$（发出112W）

$P_B = I_B U_B = 48W$（吸收48W）

$P_C = -I_C U_C = -16W$（发出16W）

$P_D = I_D U_D = 65W$（吸收65W）

$P_F = -I_F \cdot U_F = -15W$（发出15W）

由KVL得：$U_E + U_F = U_D$

$\therefore U_E = 100V$

$P_E = I_E U_E = 30W$（吸收30W）

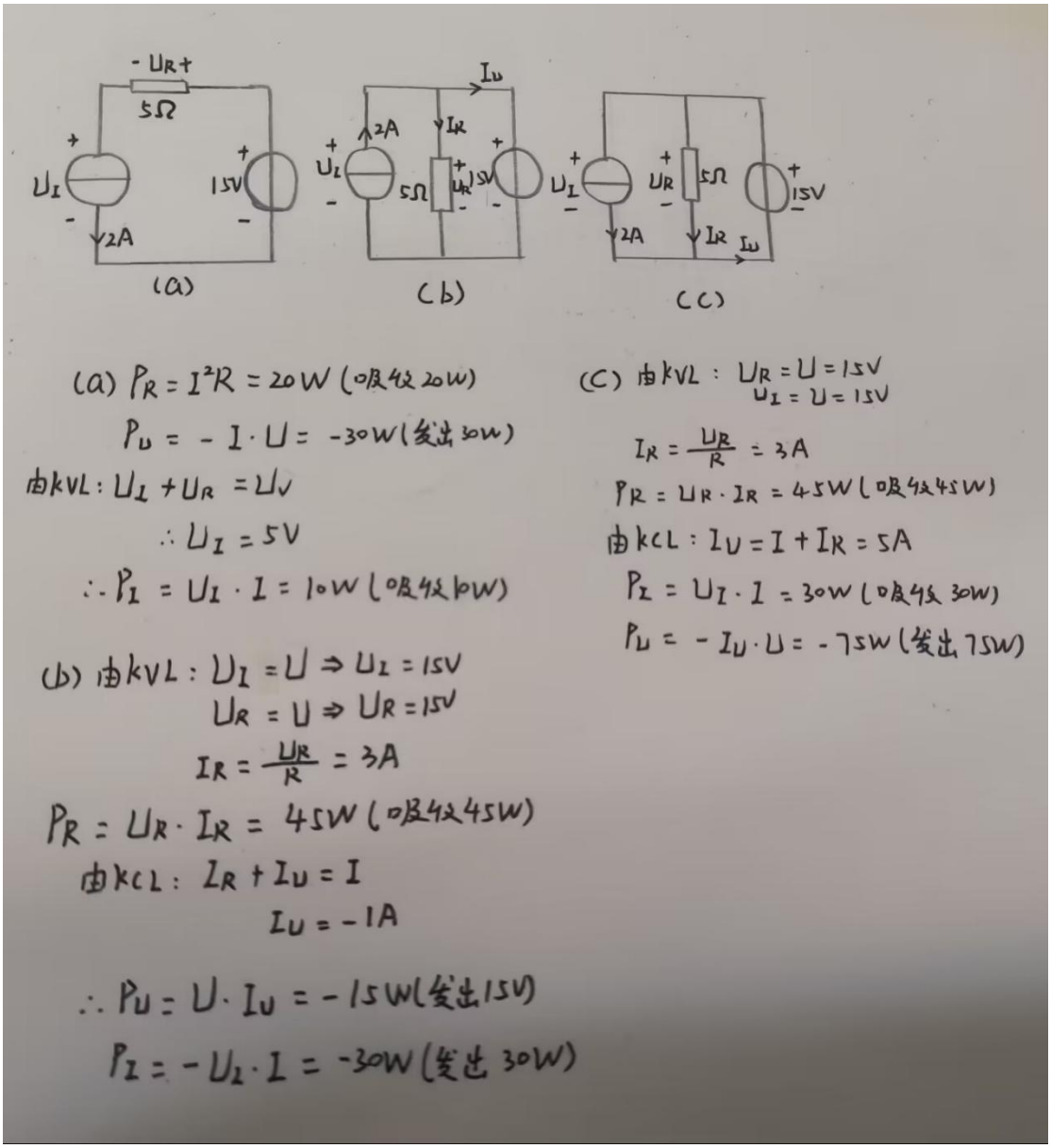
$P_{吸} = P_B + P_D + P_E = 143W$

$P_{发} = P_A + P_C + P_F = 143W$

$P_{吸} = P_{发}$

∴解答正确

1—6



(a) $P_R = I^2R = 20W$ (吸收20W)

$P_U = -I \cdot U = -30W$ (发出30W)

由KVL: $U_I + U_R = U_V$

$\therefore U_I = 5V$

$\therefore P_I = U_I \cdot I = 10W$ (吸收10W)

(b) 由KVL: $U_I = U \Rightarrow U_I = 15V$

$U_R = U \Rightarrow U_R = 15V$

$I_R = \frac{U_R}{R} = 3A$

$P_R = U_R \cdot I_R = 45W$ (吸收45W)

由KCL: $I_R + I_U = I$

$I_U = -1A$

$\therefore P_U = U \cdot I_U = -15W$ (发出15W)

$P_I = -U_I \cdot I = -30W$ (发出30W)

(C) 由KVL: $U_R = U = 15V$

$U_I = U = 15V$

$I_R = \frac{U_R}{R} = 3A$

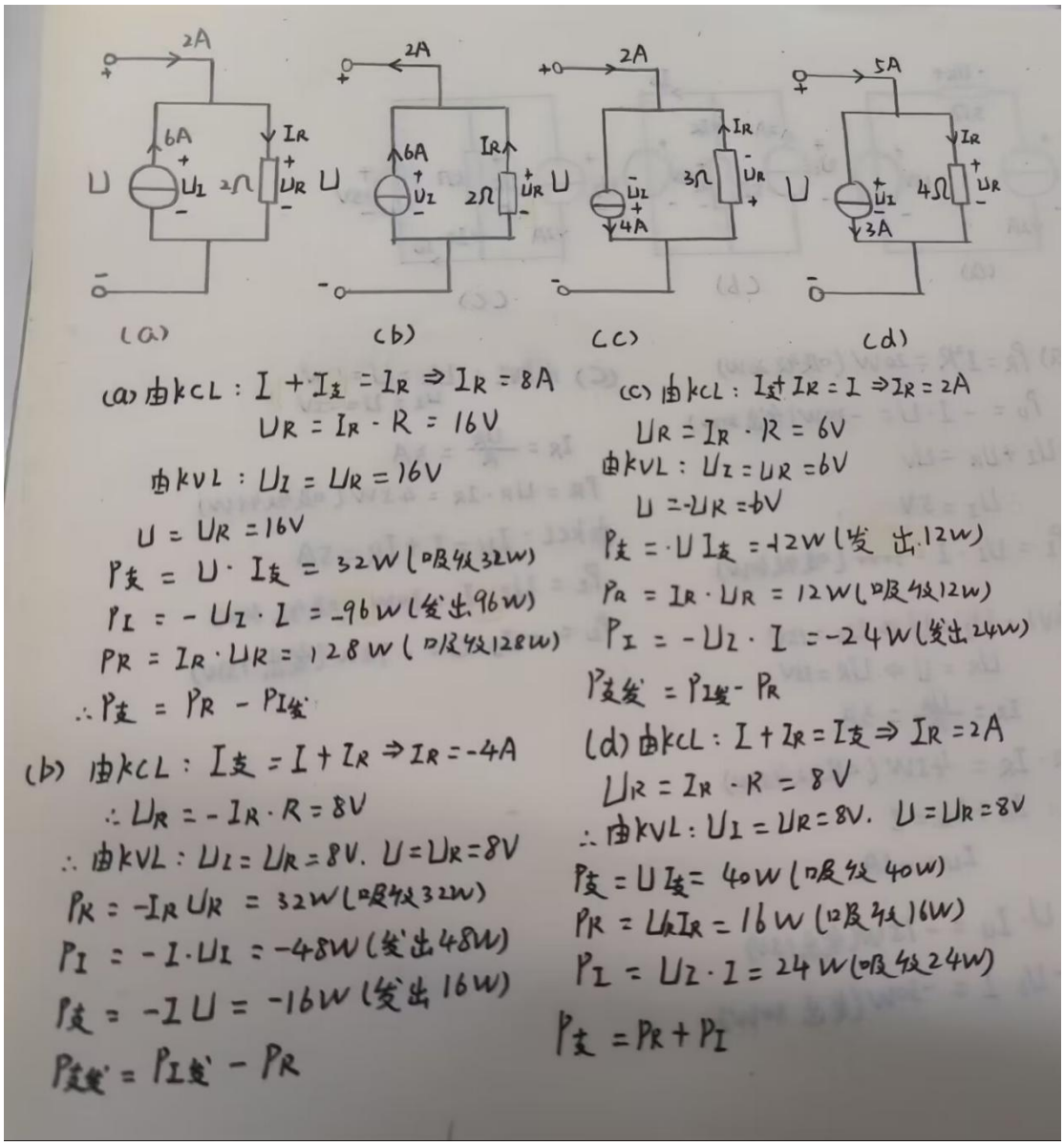
$P_R = U_R \cdot I_R = 45W$ (吸收45W)

由KCL: $I_U = I + I_R = 5A$

$P_I = U_I \cdot I = 30W$ (吸收30W)

$P_U = -I_U \cdot U = -75W$ (发出75W)

1—9



(a) 由KCL：$I + I_{支} = I_R \Rightarrow I_R = 8A$

$U_R = I_R \cdot R = 16V$

由KVL：$U_I = U_R = 16V$

$U = U_R = 16V$

$P_{支} = U \cdot I_{支} = 32W$（吸收32W）

$P_I = -U_I \cdot I = -96W$（发出96W）

$P_R = I_R \cdot U_R = 128W$（吸收128W）

$\therefore P_{支} = P_R - P_{I发}$

(b) 由KCL：$I_{支} = I + I_R \Rightarrow I_R = -4A$

$\therefore U_R = -I_R \cdot R = 8V$

$\therefore$ 由KVL：$U_I = U_R = 8V$，$U = U_R = 8V$

$P_R = -I_R U_R = 32W$（吸收32W）

$P_I = -I \cdot U_I = -48W$（发出48W）

$P_{支} = -IU = -16W$（发出16W）

$P_{支发} = P_{I发} - P_R$

(c) 由KCL：$I_{支} + I_R = I \Rightarrow I_R = 2A$

$U_R = I_R \cdot R = 6V$

由KVL：$U_I = U_R = 6V$

$U = -U_R = -6V$

$P_{支} = -UI_{支} = 12W$（发出12W）

$P_R = I_R \cdot U_R = 12W$（吸收12W）

$P_I = -U_I \cdot I = -24W$（发出24W）

$P_{支发} = P_{I发} - P_R$

(d) 由KCL：$I + I_R = I_{支} \Rightarrow I_R = 2A$

$U_R = I_R \cdot R = 8V$

$\therefore$ 由KVL：$U_I = U_R = 8V$，$U = U_R = 8V$

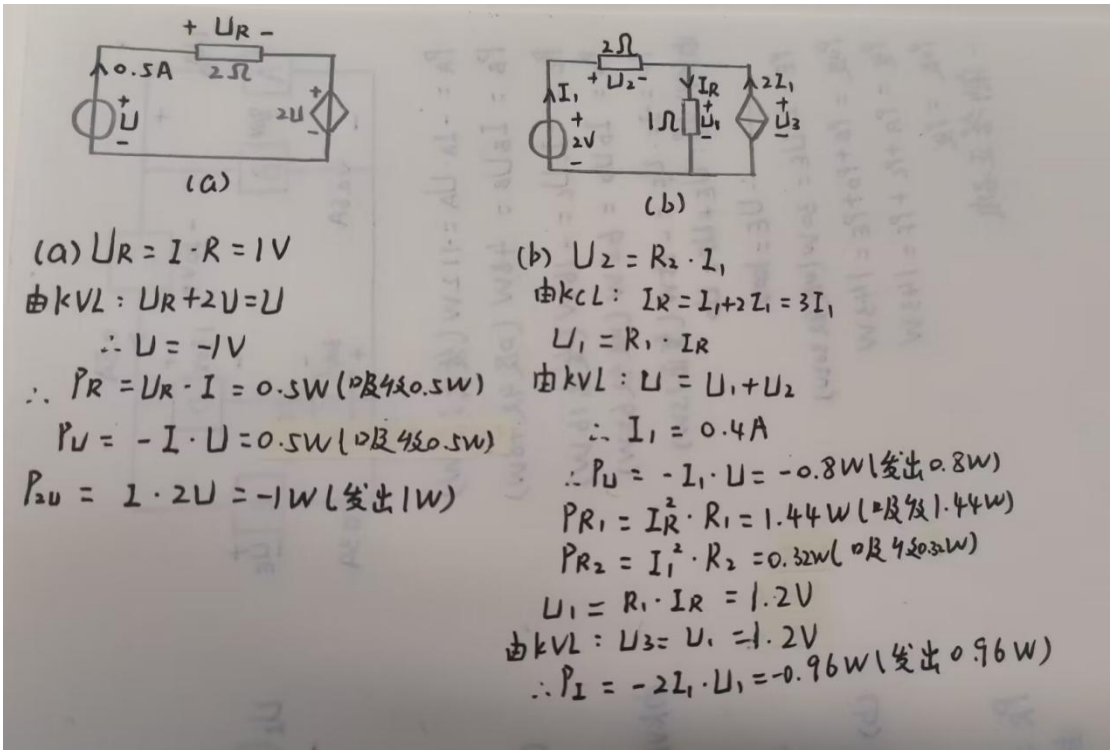
$P_{支} = UI_{支} = 40W$（吸收40W）

$P_R = U_R I_R = 16W$（吸收16W）

$P_I = U_I \cdot I = 24W$（吸收24W）

$P_{支} = P_R + P_I$

1—15



(a) $U_R = I \cdot R = 1V$

由KVL：$U_R + 2U = U$

$\therefore U = -1V$

$\therefore P_R = U_R \cdot I = 0.5W$（吸收0.5W）

$P_U = -I \cdot U = 0.5W$（吸收0.5W）

$P_{2U} = I \cdot 2U = -1W$（发出1W）

(b) $U_2 = R_2 \cdot I_1$

由KCL：$I_R = I_1 + 2I_1 = 3I_1$

$U_1 = R_1 \cdot I_R$

由KVL：$U = U_1 + U_2$

$\therefore I_1 = 0.4A$

$\therefore P_U = -I_1 \cdot U = -0.8W$（发出0.8W）

$P_{R_1} = I_R^2 \cdot R_1 = 1.44W$（吸收1.44W）

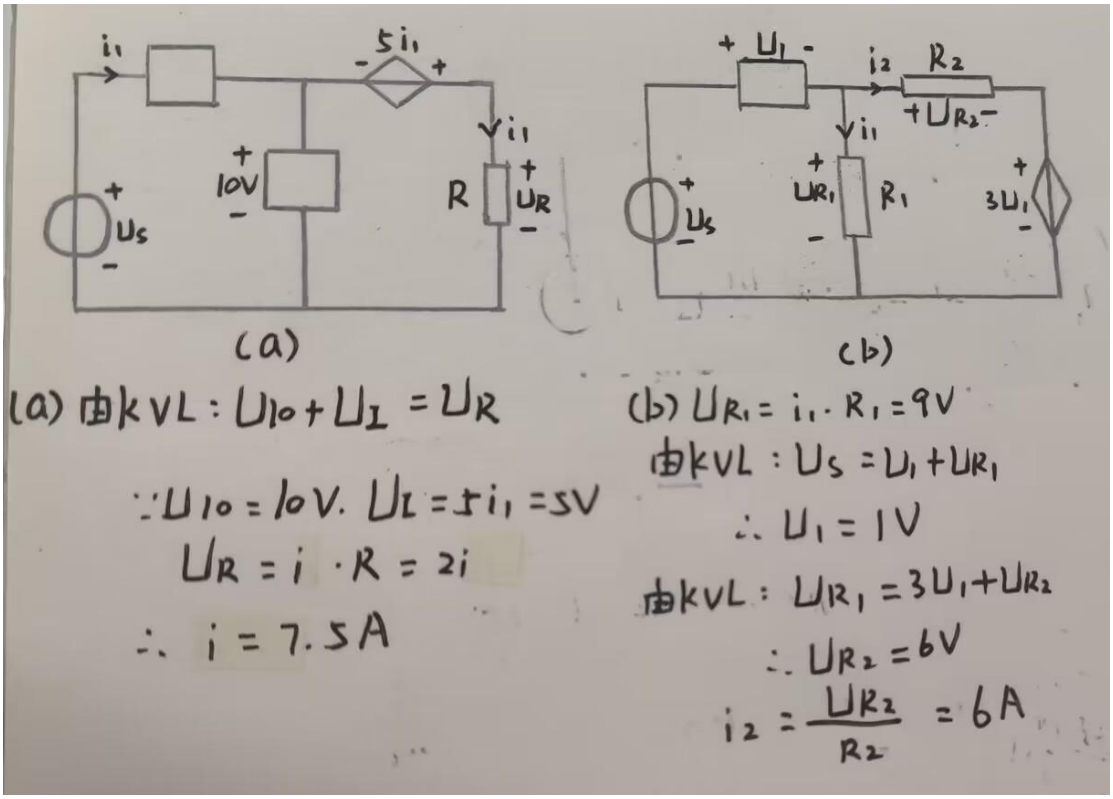
$P_{R_2} = I_1^2 \cdot R_2 = 0.32W$（吸收0.32W）

$U_1 = R_1 \cdot I_R = 1.2V$

由KVL：$U_3 = U_1 = 1.2V$

$\therefore P_I = -2I_1 \cdot U_1 = -0.96W$（发出0.96W）

1—17



(a) 由KVL：$U_{10} + U_I = U_R$

$\because U_{10} = 10V$，$U_I = 5i_1 = 5V$

$U_R = i \cdot R = 2i$

$\therefore i = 7.5A$

(b) $U_{R_1} = i_1 \cdot R_1 = 9V$

由KVL：$U_S = U_1 + U_{R_1}$

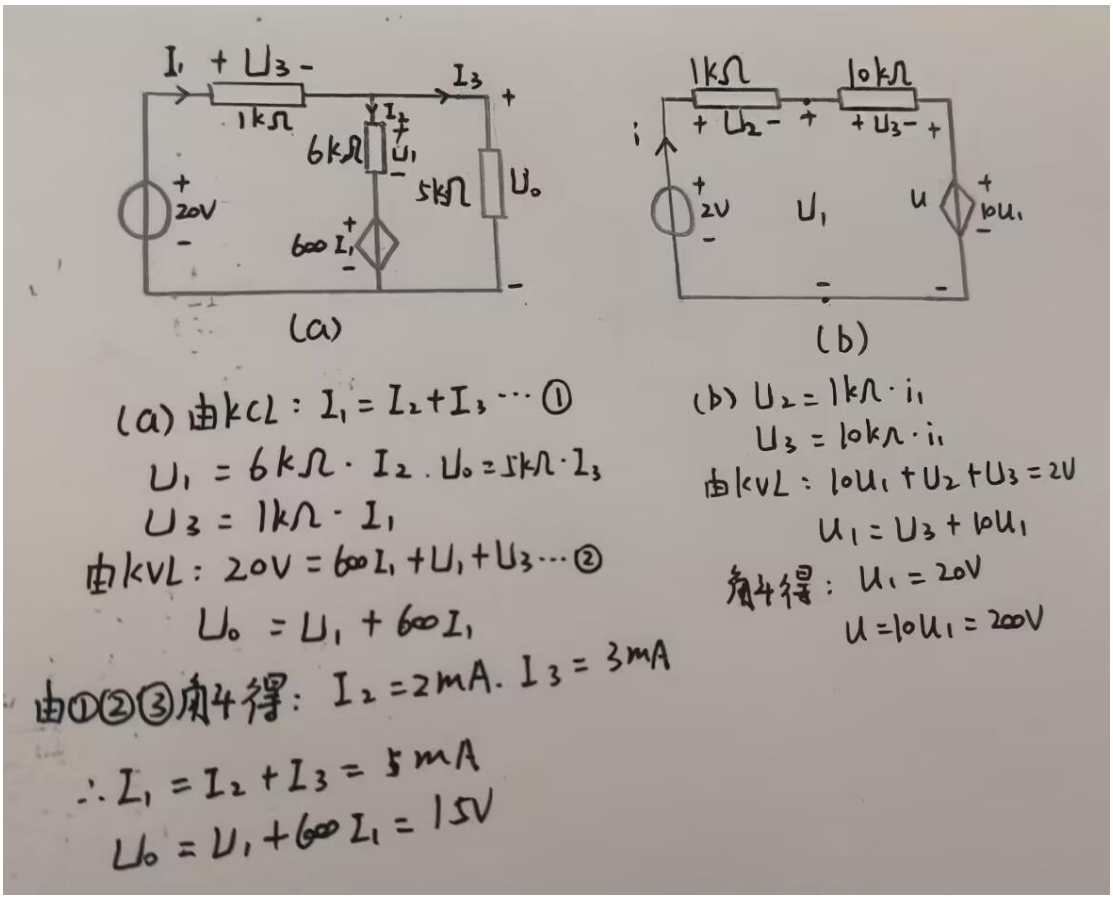
$\therefore U_1 = 1V$

由KVL：$U_{R_1} = 3U_1 + U_{R_2}$

$\therefore U_{R_2} = 6V$

$i_2 = \frac{U_{R_2}}{R_2} = 6A$

1—18


I1
+ U3 -
I3
1kΩ
I2
6kΩ
U1
5kΩ
U0
20V
600 I1
(a)
1kΩ
10kΩ
+ U2 -
+ U3 -
i1
2V
U1
U
10U1
(b)
(a) 由KCL：$I_1 = I_2 + I_3 \cdots ①$
$U_1 = 6k\Omega \cdot I_2$. $U_0 = 5k\Omega \cdot I_3$
$U_3 = 1k\Omega \cdot I_1$
由KVL：$20V = 600I_1 + U_1 + U_3 \cdots ②$
$U_0 = U_1 + 600I_1$
由①②③解得：$I_2 = 2mA$. $I_3 = 3mA$
$\therefore I_1 = I_2 + I_3 = 5mA$
$U_0 = U_1 + 600I_1 = 15V$
(b) $U_2 = 1k\Omega \cdot i_1$
$U_3 = 10k\Omega \cdot i_1$
由KVL：$10U_1 + U_2 + U_3 = 2U$
$U_1 = U_3 + 10U_1$
解得：$U_1 = 20V$
$U = 10U_1 = 200V$