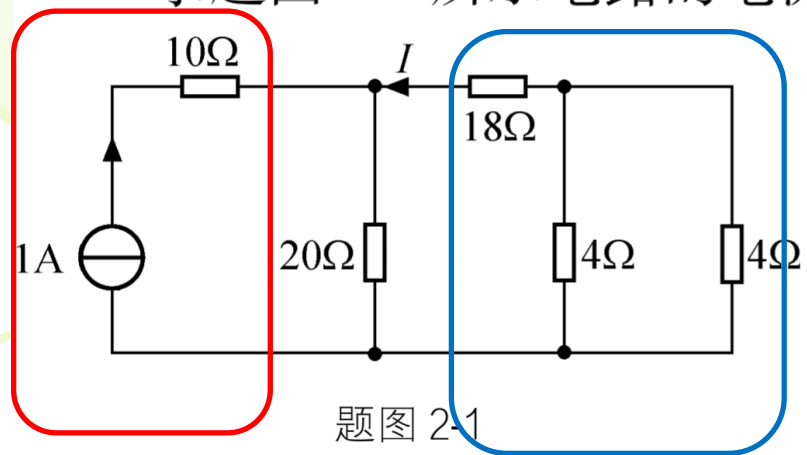


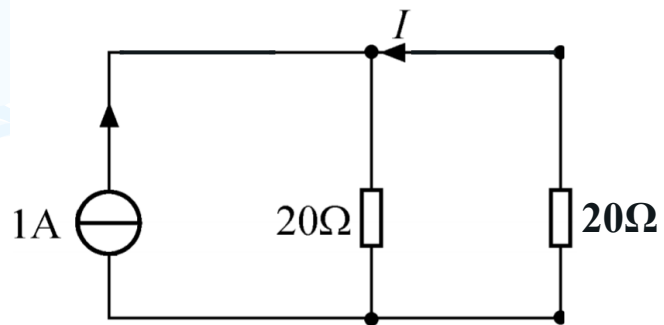
2-1 求题图 2-1 所示电路的电流 i 。



解：先进行等效变换：

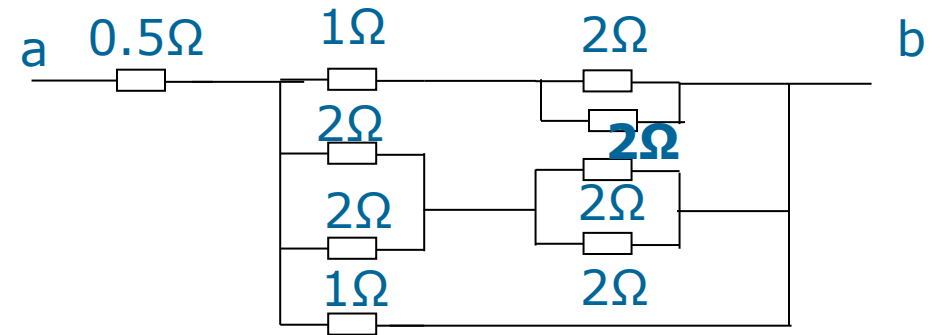
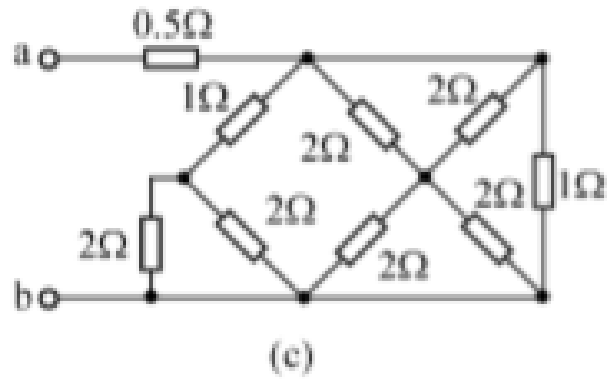
红色部分：电流源和电阻串联等效为1A电流源

蓝色部分：电阻 $4//4+18=20\Omega$

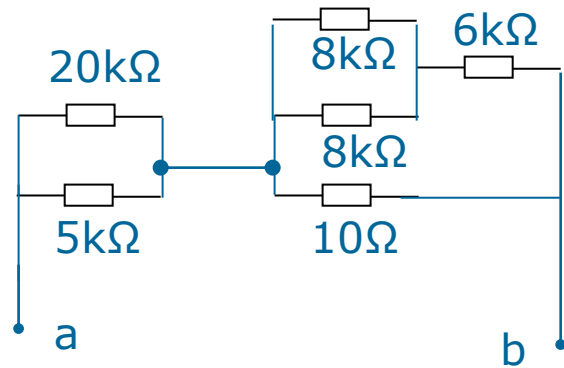
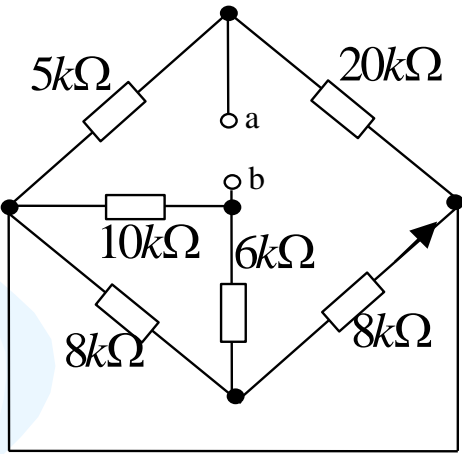


$$I = -1 \times \frac{20}{20+20} = -0.5\text{A}$$

2-3求等效电阻 R_{ab}



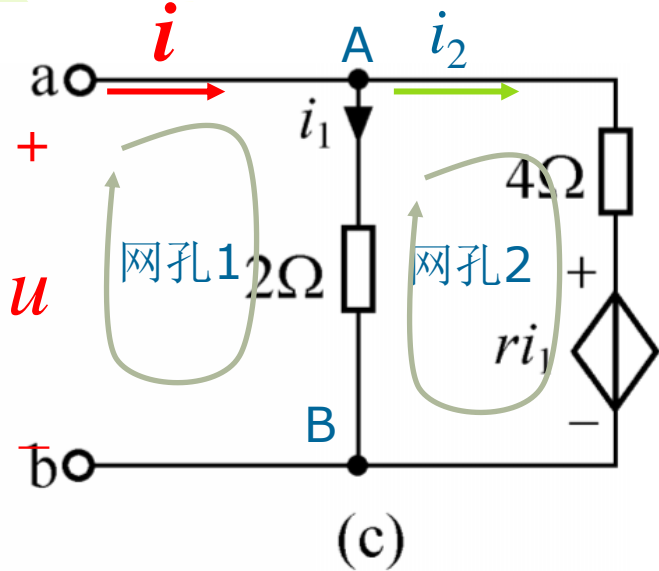
$$(c) \quad R_{ab} = 0.5 + 1 // (1 + 2 // 2) // (2 // 2 + 2 // 2) = 1\Omega$$



解d

(d)由图可得: $R_{ab} = 5 // 20 + 10 // [8 // 8 + 6] = 9k\Omega$

2-5 C



仅含受控源和电阻的电路最终等效成一个电阻。设端口上的电压为 u , 电流为 i , 方向如图所示, 取关联参考。

对网孔1 (广义回路) 列KVL方程: $u = 2i_1$

网孔2列KVL方程: $-2i_1 + 4i_2 + ri_1 = 0$

对节点A列些KCL方程: $i_1 + i_2 - i = 0$

得

$$R_{ab} = \frac{u}{i} = \frac{8}{6-r}$$

2-7 电路如题图2-10所示, (1)若 $U_2=10V$, 求电流 I_1 和电源电压 U_s ; (2)若 $U_s=10V$, 求电压 U_2 。

解: (1) $I_2 = \frac{U_2}{20} = 0.5A$

$$U_3 = I_2(10 + 20) = 15V$$

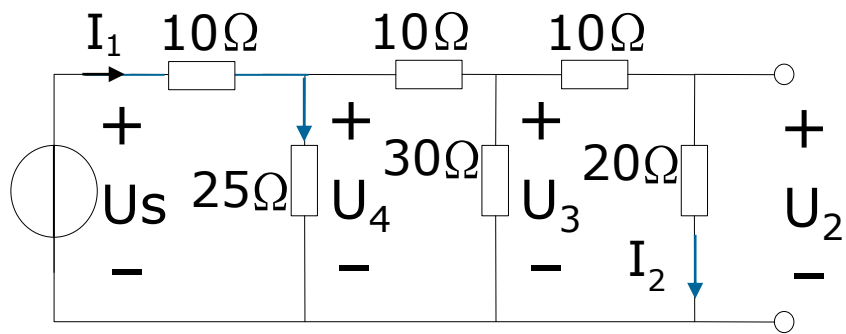
$$U_4 = \left(\frac{U_3}{30} + I_2 \right) \times 10 + U_3 = 25V \quad \therefore I_1 = \frac{U_4}{25} + \frac{U_3}{30} + I_2 = 2A$$

$$U_s = I_1 \times 10 + U_4 = 45V$$

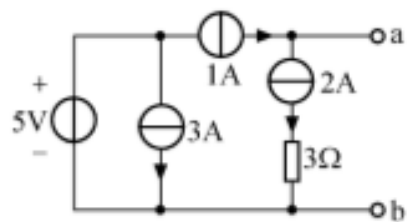
(2) $I_1 = \frac{U_s}{10 + 25 // [10 + 30 // (10 + 20)]} = \frac{10}{22.5} A$

$$\therefore I_2 = \frac{10}{22.5} \times \frac{25}{25 + [10 + 30 // (10 + 20)]} \times \frac{25}{30 + 10 + 20} = \frac{10}{22.5} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{9} A$$

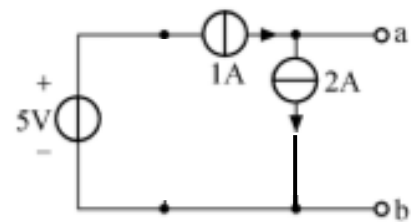
$$U_2 = I_2 \times 20 = \frac{20}{9} V$$



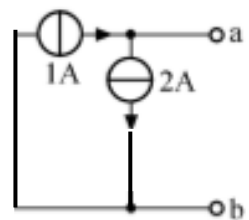
2-8 化简电路



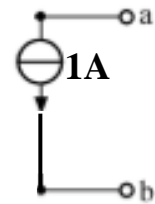
(a)



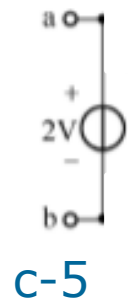
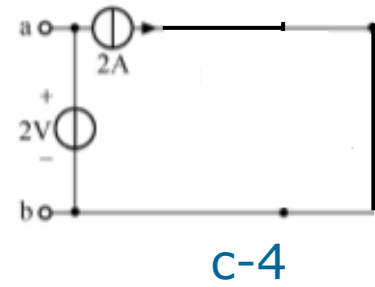
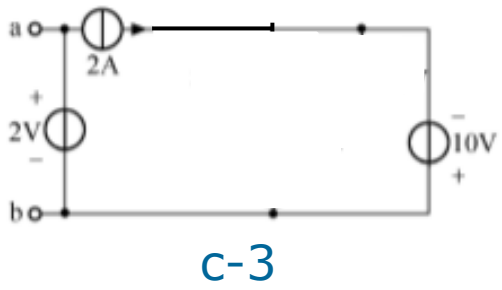
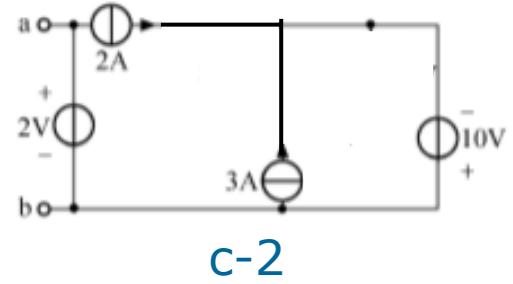
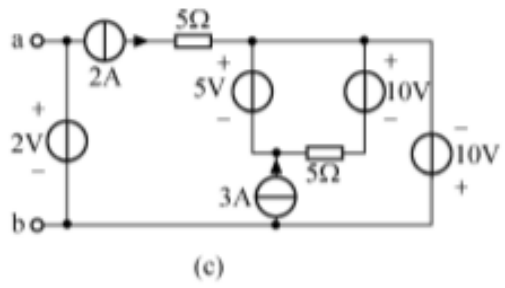
a-2



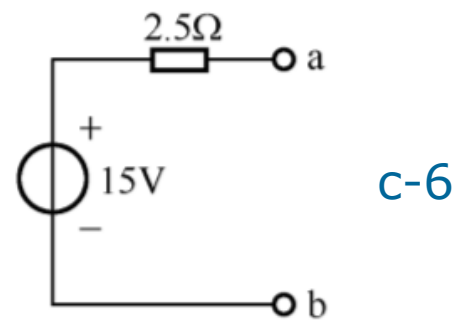
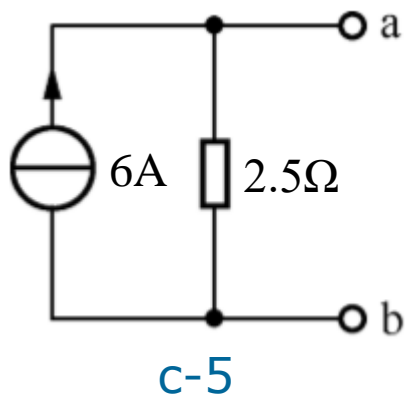
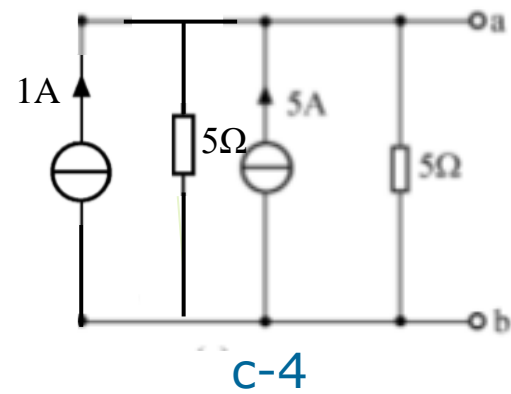
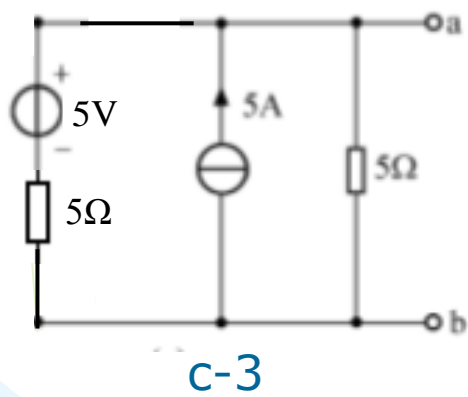
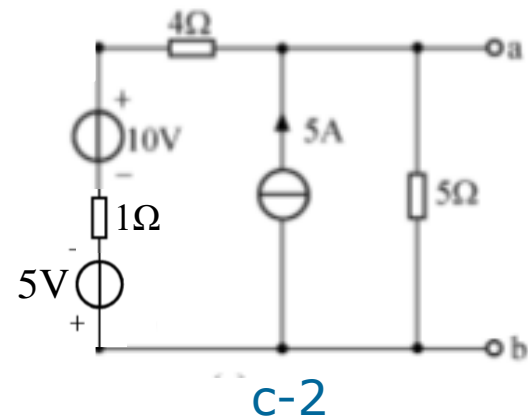
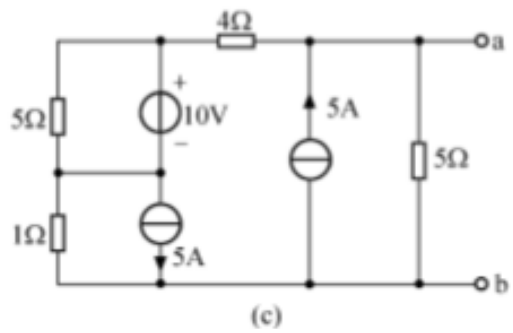
a-3



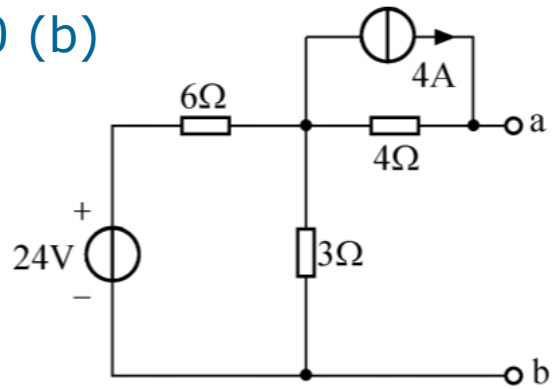
a-4



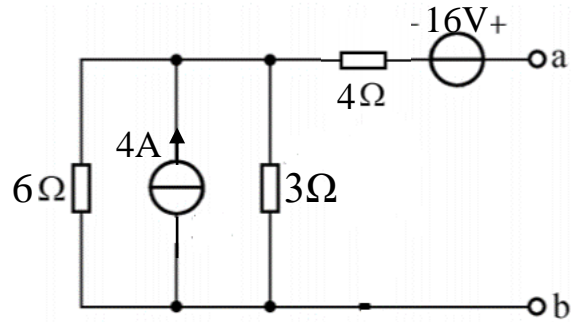
2-9C 化简电路为戴维南等效电路



2-10 (b)

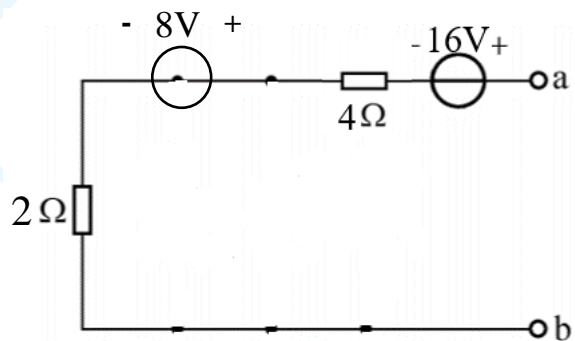


(b)

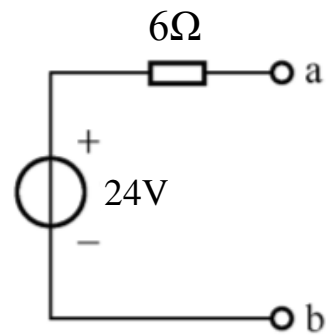


$$3//6=2\Omega$$

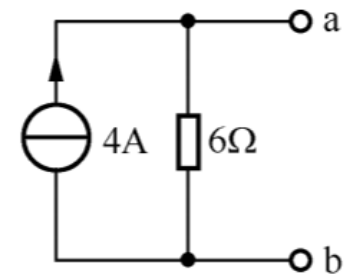
b-1



b-2

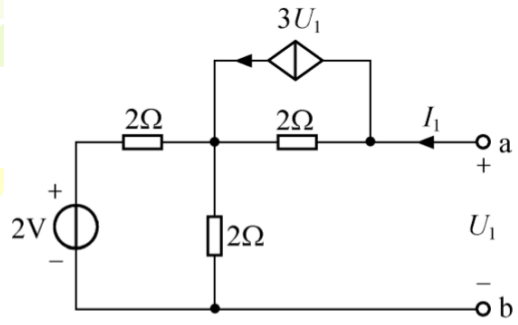


b-3

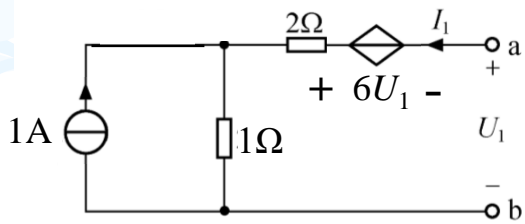
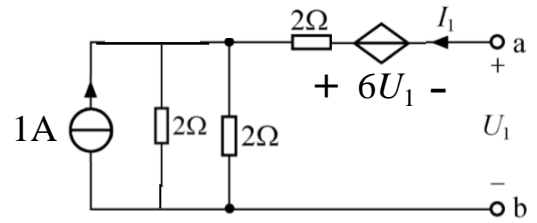


b-4

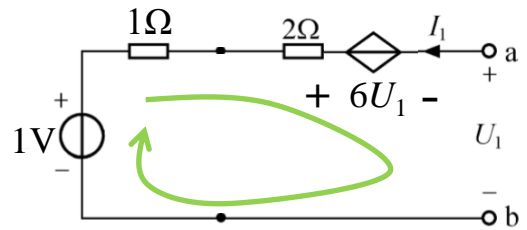
2-15 (a) 化简电路为戴维南等效电路



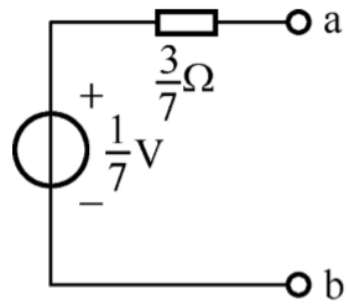
(a)



(a)



(a)

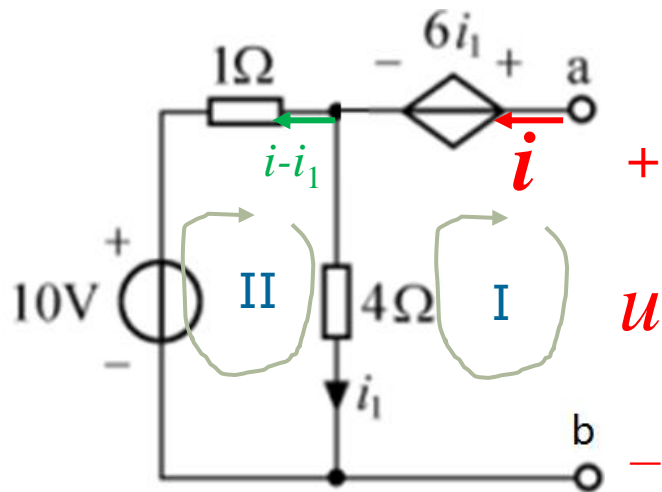
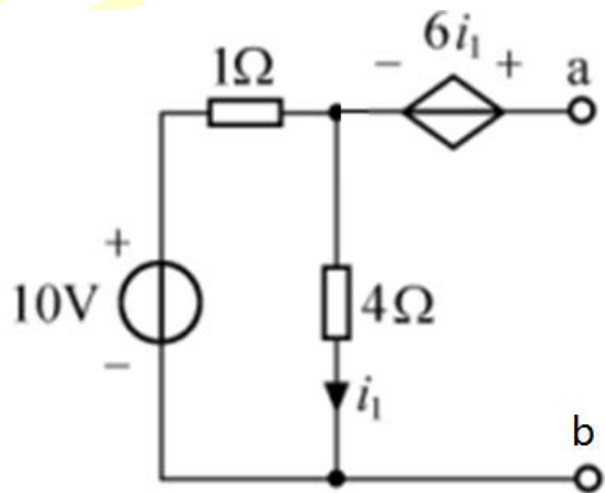


(a)

$$U_1 - 1 - 3I_1 + 6U_1 = 0$$

$$U_1 = \frac{1}{7} + \frac{3}{7}I_1$$

2-15(b)

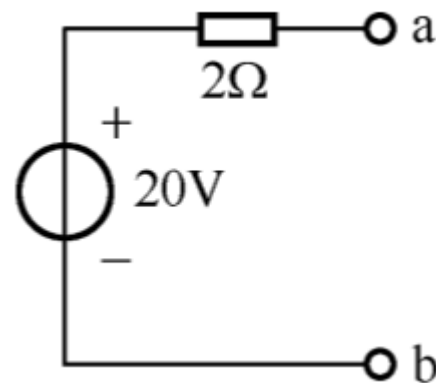


设端口上的电压电流如果所示参考方向

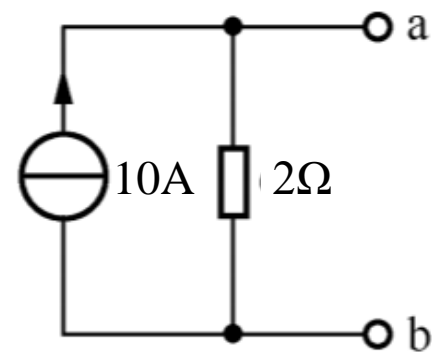
I网孔: $u - 4i_1 - 6i_1 = 0$

II网孔: $4i_1 - 10 - (i - i_1) = 0$

消去 i_1 : $u = 2i + 20$

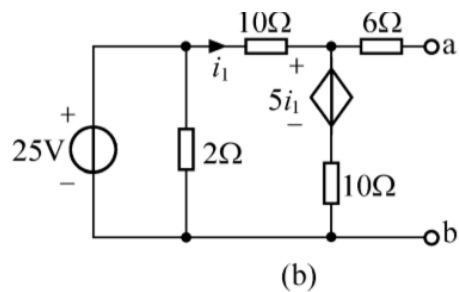


戴维南电路

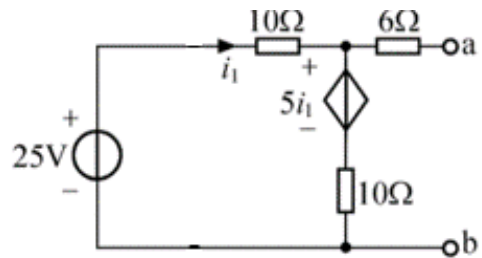


诺顿电路

2-16b 化为诺顿等效电路



电路等效为



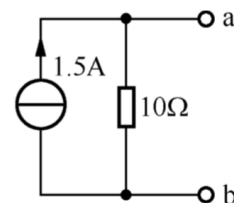
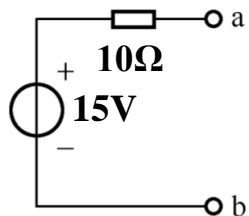
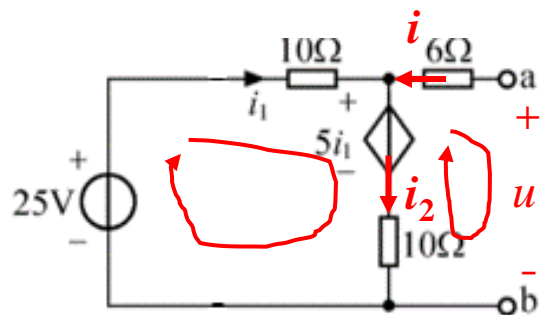
解法1 加压求流法

$$-25 + 10i_1 + 5i_1 + 10i_2 = 0$$

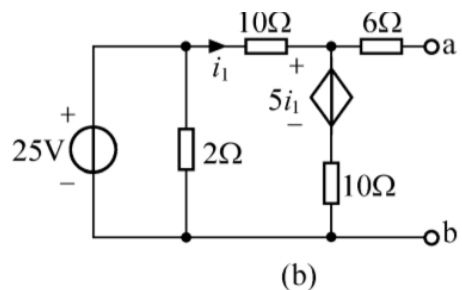
$$u - 10i_2 - 5i_1 - 6i = 0$$

$$i_2 - i_1 - i = 0$$

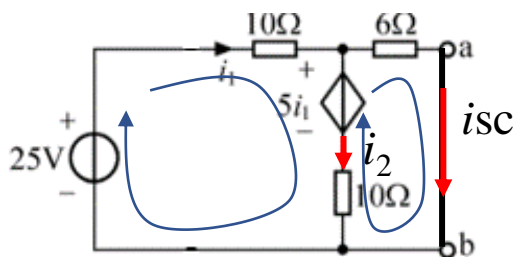
$$u = 10i + 15$$



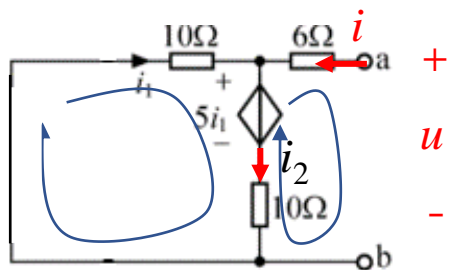
2-16b 化为诺顿等效电路



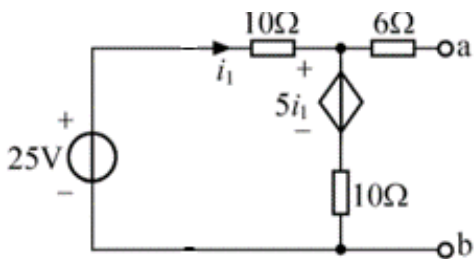
1. 求isc



2. 求等效电阻R0, 加压求流法



电路等效为



解法2: 第四章诺顿定理:

对两网孔列些KVL方程

$$-25 + 10i_1 + 5i_1 + 10i_2 = 0$$

$$6i_{sc} - 10i_2 - 5i_1 = 0$$

对节点列些KCL

$$-i_1 + i_2 + i_{sc} = 0$$

得 $i_{sc} = 1.5A$

设端口电流为*i*, 电压为*u*

对两回路列些KVL,对节点列些KCL

得 $R_0 = 10\Omega$

$$10i_1 + 5i_1 + 10i_2 = 0$$

$$-6i + u - 10i_2 - 5i_1 = 0$$

$$-i - i_1 + i_2 = 0$$

