2-1. 求图示电路中的电压U 。

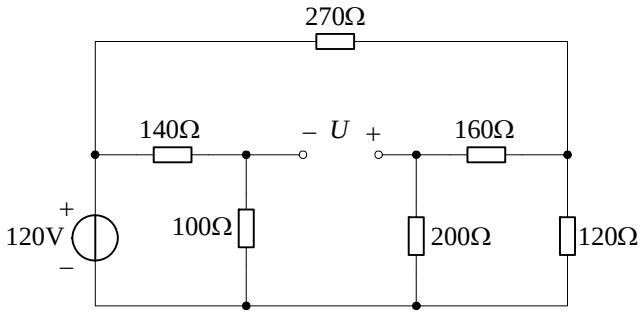


图 2-1

【解】所用电量的参考方向如图 2-1（a）所示。

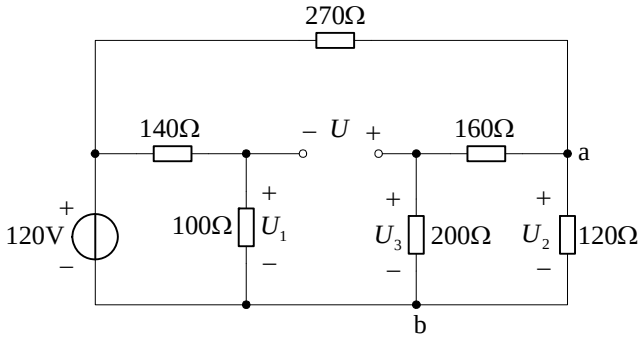


图 2-1（a）

由电阻串并联公式得：$R_{ab}=\left(200+160\right)//120=90\Omega$

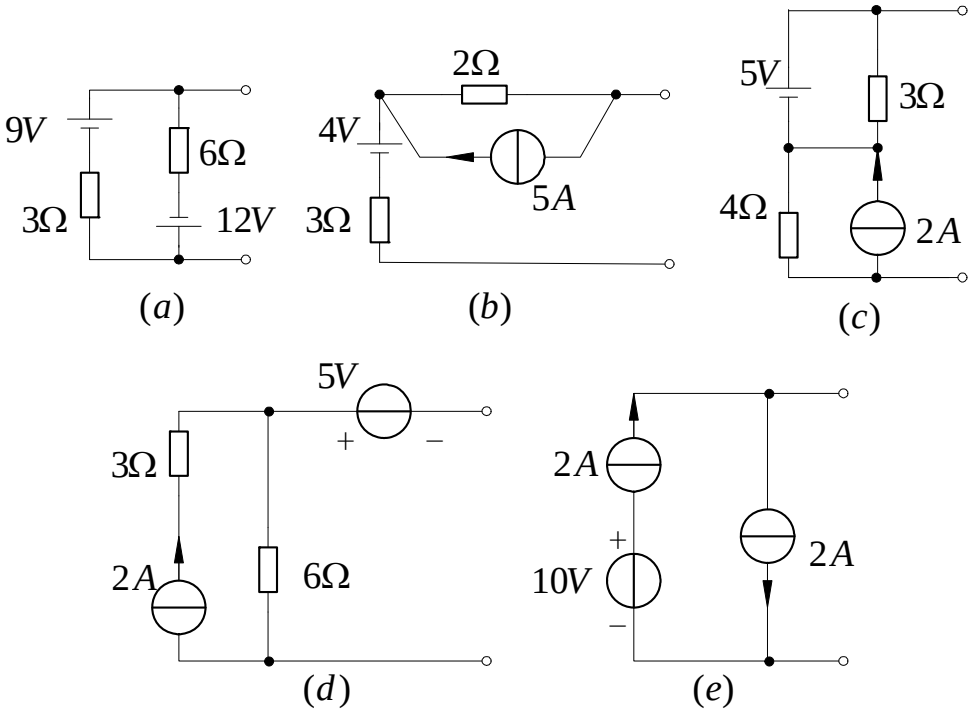
由分压公式得：$U_1=\dfrac{100}{100+140}\times120=50\text{V}$

$$U_2=\frac{R_{ab}}{R_{ab}+270}\times120=\frac{90}{90+270}\times120=30\text{V}$$

$$U_3=\frac{200}{200+160}\times U_2=\frac{200}{200+160}\times30=\frac{50}{3}\text{V}$$

由 KVL 得：$U=U_3-U_1=\dfrac{50}{3}-50=-\dfrac{100}{3}\text{V}$

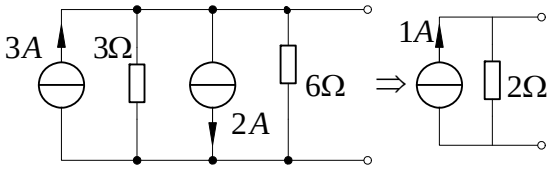
2-2 将图 2-2 所示的电路化成最简单的电路（即电压源与电阻串联或电流源与电阻并联），并标出元件的参数。



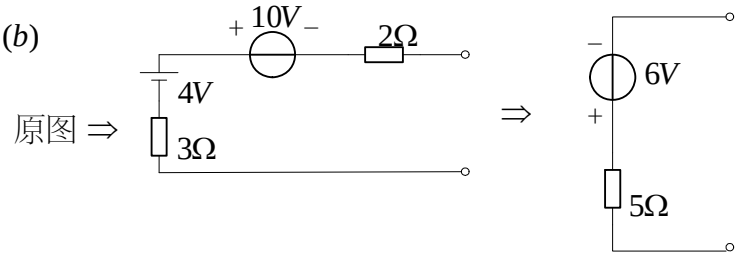
题 2-2

【解】

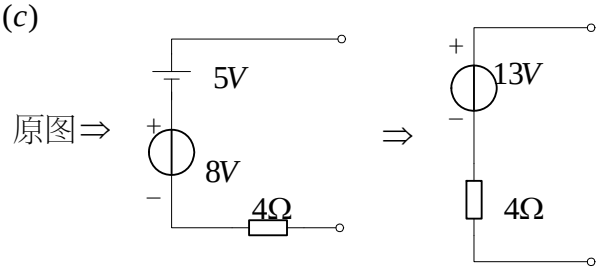
(a) 原图 ⇒



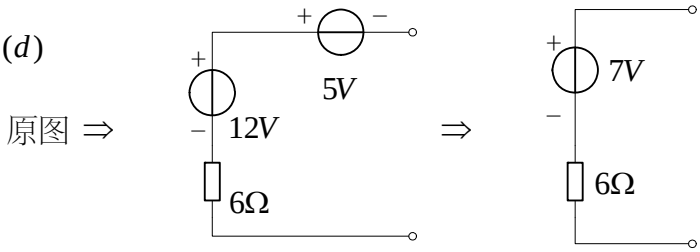
(b)



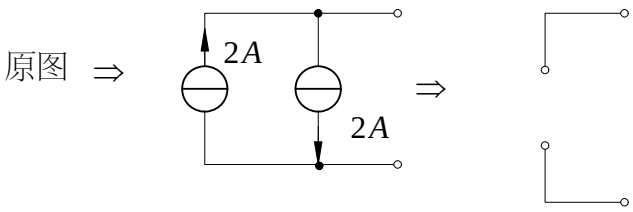
(c)



(d)



(e)



2-3 用等效变换的方法，求图 2-3 所示电路中指定的电流。

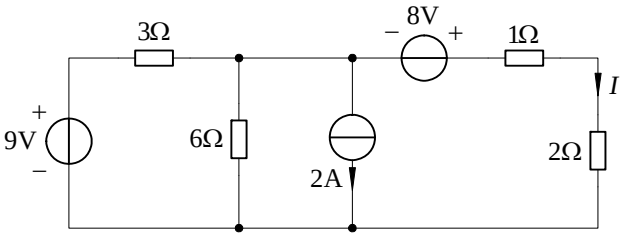
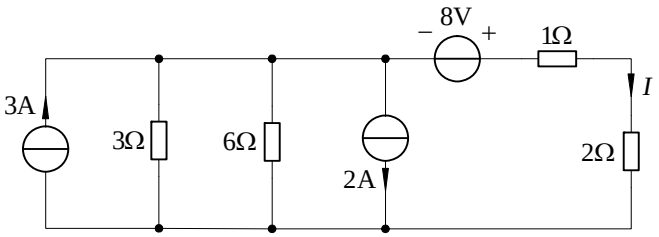
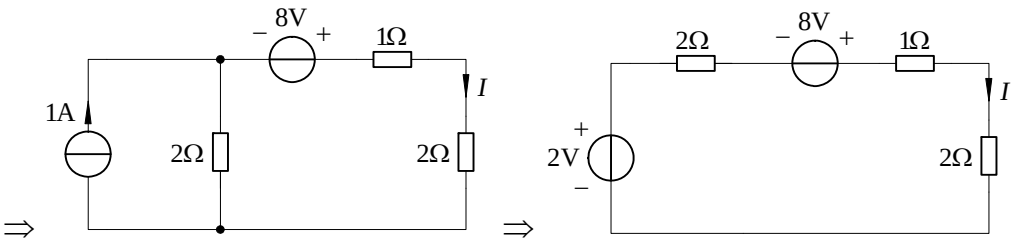
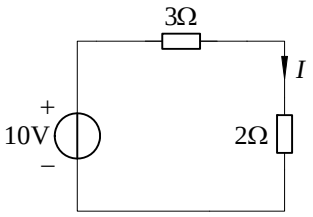


图 2-3

【解】原电路⇒







所以 $I=\dfrac{10}{3+2}=2\text{A}$

2-4 用等效变换的方法，求图 2-4 所示电路中指定的电压。

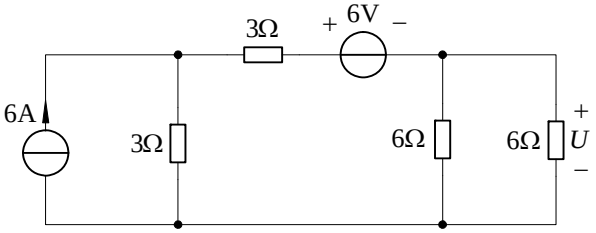
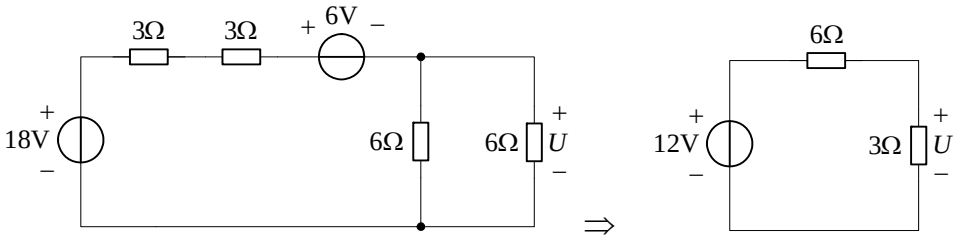


图 2-4

【解】原电路⇒



$$U=\frac{3}{3+6}\times 12=4\text{V}$$

2-5. 试用等效化简的方法求图 2-5 示电路中电流 I、电压 U 和 4Ω 消耗的功率。

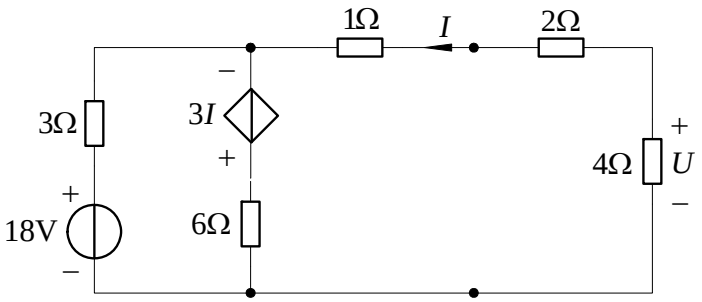
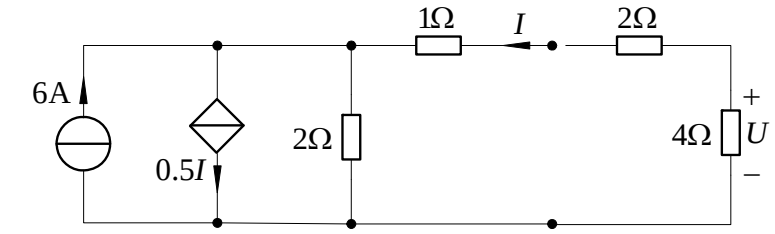
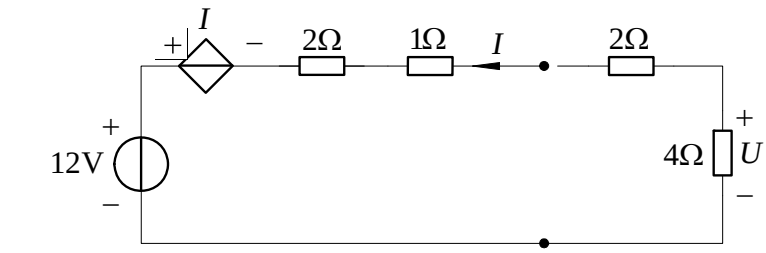


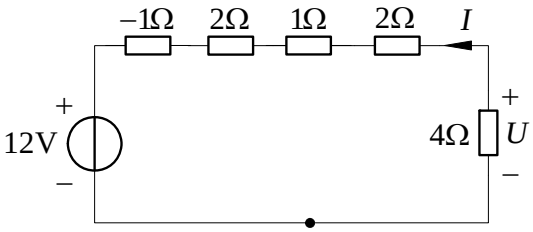
图 2-5

【解】 对原电路进行等效化简，过程如下：





⇒



列写 KVL：$12+(-1+2+1+2+4)I=0$，　$I=-1.5\text{A}, U=-(-1.5)\times 4=6\text{V}$

所以，4Ω 消耗的功率为: $P_{4\Omega}=I^2\times 4=(-1.5)^2\times 4=\dfrac{U^2}{4}=9\text{W}$

2-6. 求如图 2-6 所示二端网络的输入电阻。

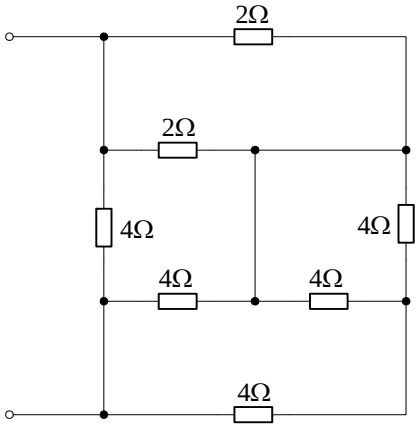
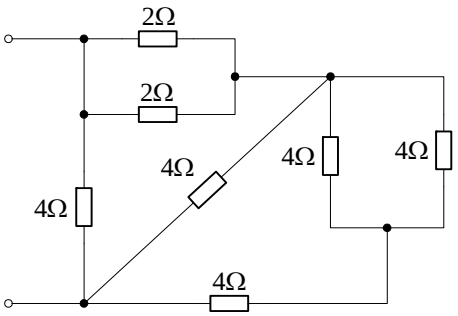
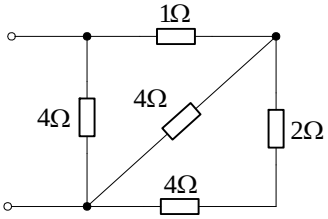


图 2-6

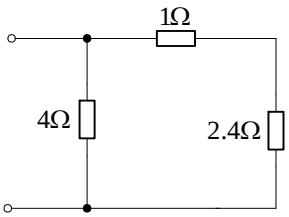
【解】原电路⇒（把短路线缩成一个点）



⇒



⇒



所以输入电阻：$R_{\text{in}} = 4//(1+2.4) = \dfrac{68}{37}\Omega$

2-7. 求如图 2-7 所示二端网络的输入电阻。

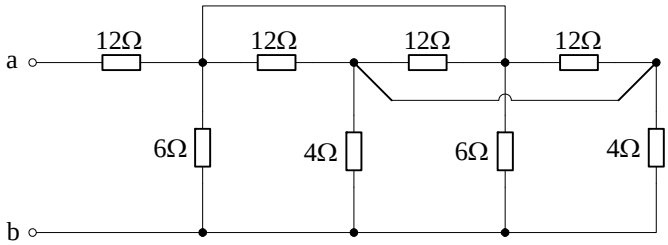
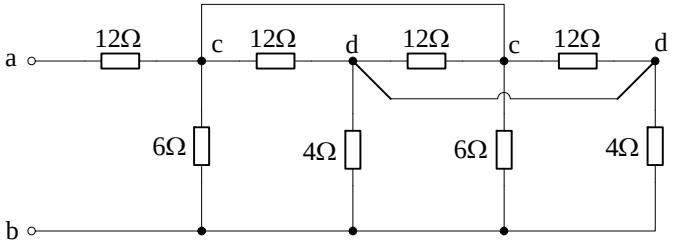
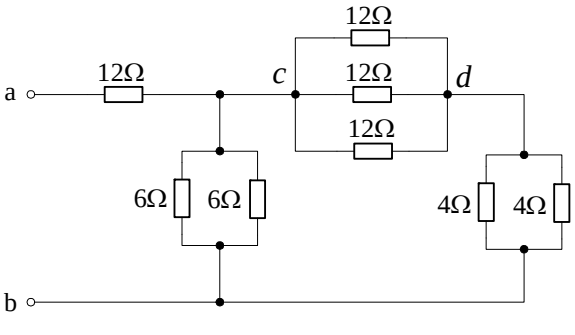


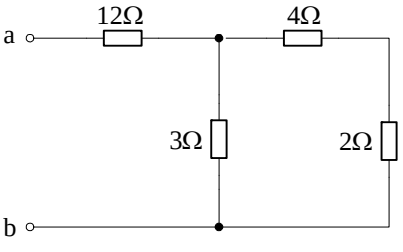
图 2-7

【解】 将用短路线连接的点标上相同的字母，并再画出电路。

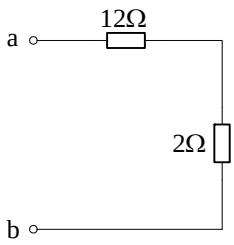




⇒



⇒



所以输入电阻：$R_{\text{ab}} = 12+2 = 14\Omega$

2-8. 求如图 2-8 所示二端网络的输入电阻。

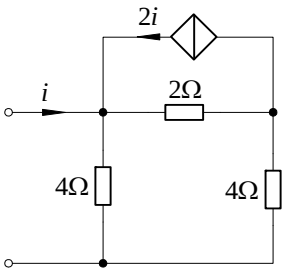
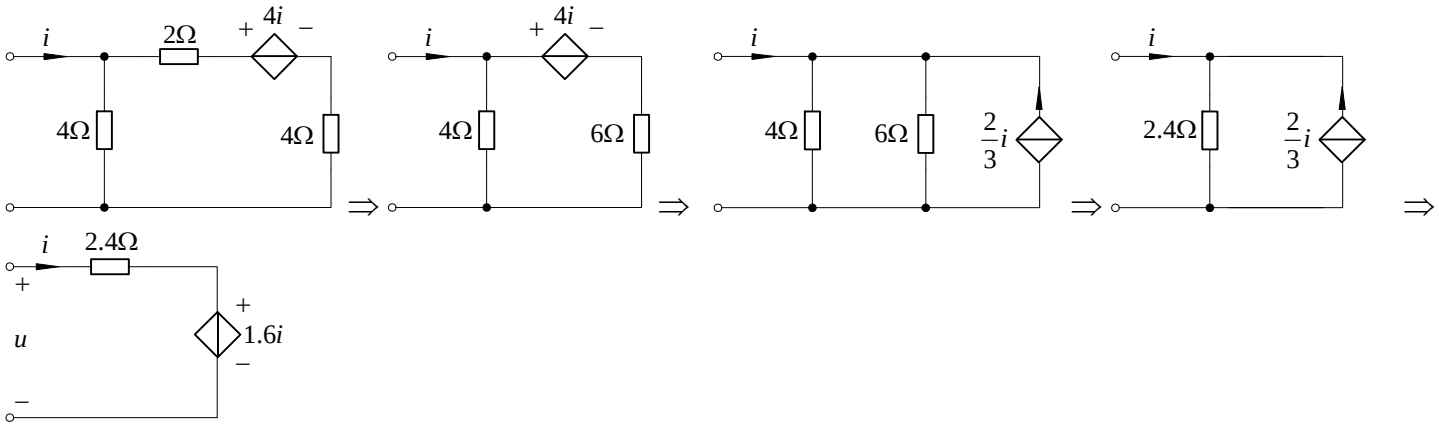


图 2-8

【解】原电路⇒



由 KVL 得：$u = 2.4i + 1.6i = 4i$　　所以，输入电阻为：$R_{\text{in}} = \dfrac{u}{i} = 4\Omega$

2-9 求如图 2-9 所示二端网络的输入电阻。

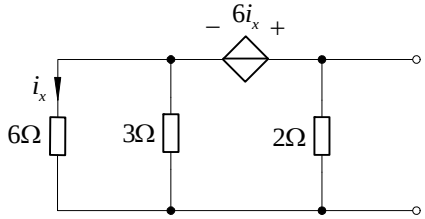


图 2-9

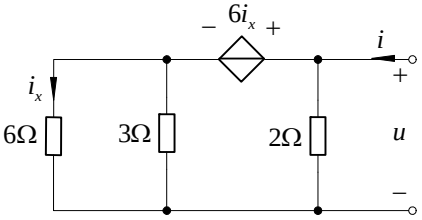


图 2-9（a）

【解】端口电压和端口电流的参考方向如图 2-9（a）所示。

方法一：

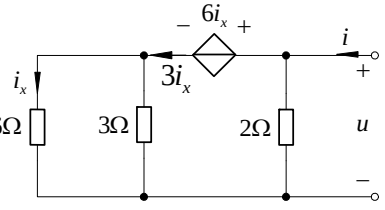
由 KVL 和元件的 VAR 得：$u = 6i_x + 6i_x = 12i_x$

由 KCL 和元件的 VAR 得：$i = \dfrac{u}{2} + i_x + \dfrac{6i_x}{3} = \dfrac{12i_x}{2} + 3i_x = 9i_x$

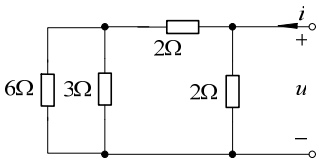
所以输入电阻：$R_{\text{in}} = \dfrac{u}{i} = \dfrac{12i_x}{9i_x} = \dfrac{4}{3}\Omega$

方法二：

原图 ⇒



⇒ (受控源可以用电阻代替 $R = \dfrac{6i_x}{3i_x} = 2\Omega$)



$$R_{\text{in}} = \frac{2\times(2+\frac{6\times3}{6+3})}{2+(2+\frac{6\times3}{6+3})} = \frac{4}{3}\Omega$$