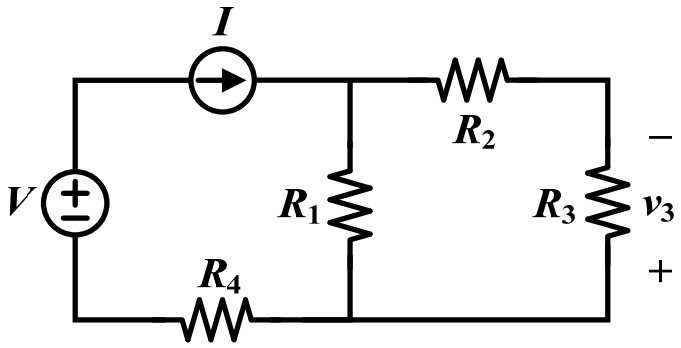
電路學(EE2210)第二次隨堂考

2015年3月18日
時間：10 分鐘
Close Book

學號：_____

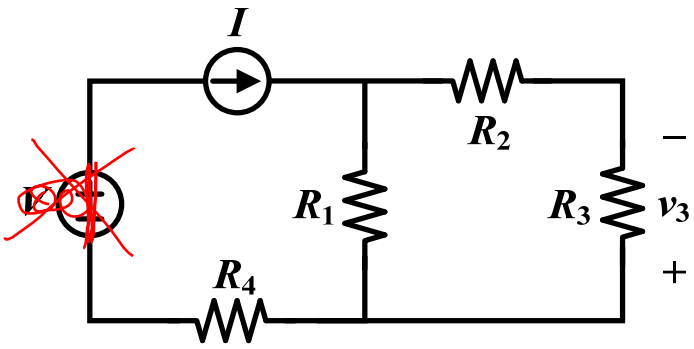
姓名：_____

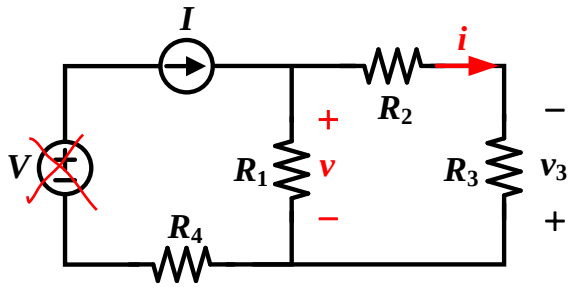
By using the element-combination rules and the collapse-then-expand method, determine explicitly the voltage v_3 in the following circuit in terms of R_1, R_2, R_3, R_4, V and I.



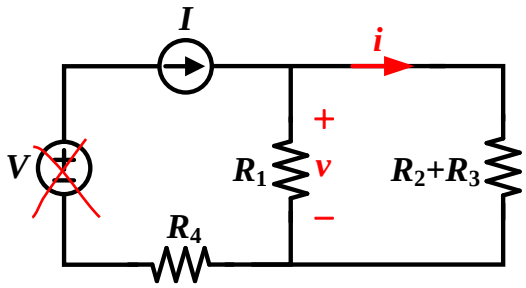
Solutions:

Let us collaps two independent sources by using element-combination rule. Since these two sources are connected serialy, thus the current is set by current source. Note that the voltage across current cource can be any value. Thus the voltage source play no role in this connection.

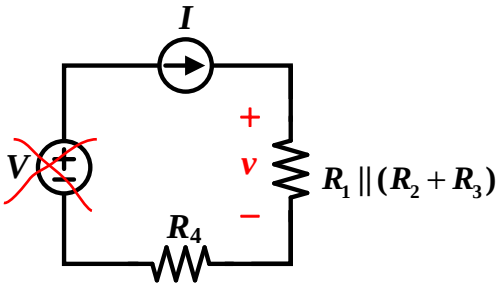




(a)



(b)



(c)

The circuit will be collapsed as shown Figure (a) to (c). From Figure (c), we can find v as:

$$v = I \times \left[R_1 \parallel (R_2 + R_3)\right] = I \times \frac{R_1(R_2 + R_3)}{R_1 + R_2 + R_3}$$

By expending back to Figure (b), we can find i as:

$$i = \frac{v}{R_2 + R_3} = I \times \frac{R_1}{R_1 + R_2 + R_3}$$

The voltage v_3 across R_3 can be evaluated by expending back to Figure (a) as:

$$v_3 = -i \times R_3 = -I \times \frac{R_1 R_3}{R_1 + R_2 + R_3}$$

$$v_3 = -I \times \frac{R_1 R_3}{R_1 + R_2 + R_3}.$$