

基礎電子學實驗 2020/10/13 預習報告

實驗目的

驗證及使用 Thevenin Theorem

相關知識

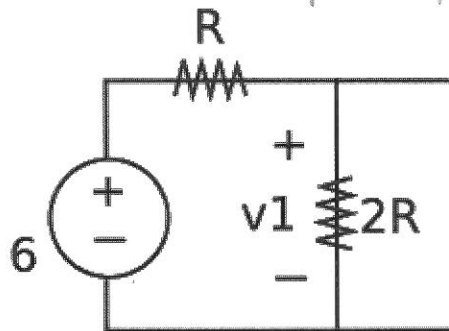
1. 基本電路分析 (基礎電子學課程 up to 10/6)
2. Thevenin Theorem (10/13 基礎電子學課程)

預習項目

等效電路的計算 (symbolic computation)

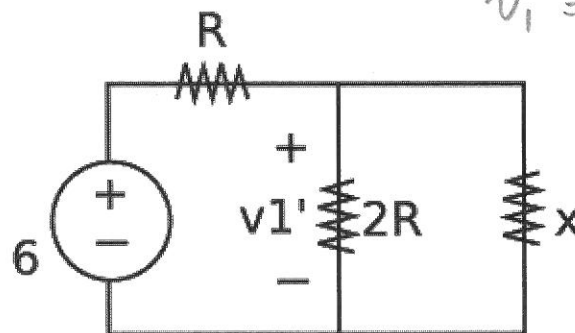
如下圖之電路，求 branch voltage $v_1 =$ _

$$V_1 = 6 \times \frac{2R}{R+2R} = 4$$



承上，若接著並聯一電阻值為 x 歐姆之電阻，如下圖，求 x 應為多少才能使得 branch voltage v_1' 降為原先 v_1 的一半？

$$v_1' = \frac{1}{2} v_1 = 2$$



Using the combination of voltage divider and equivalent resistor, we have:

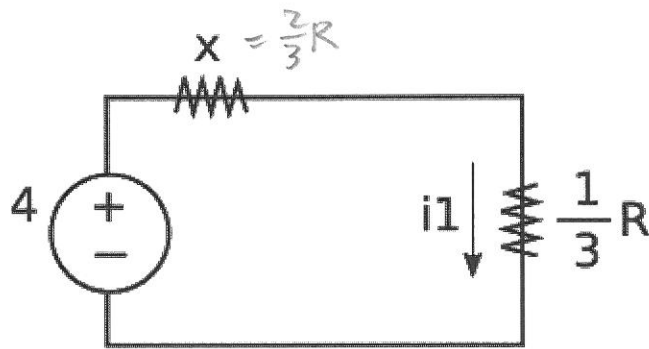
承上，將電阻值 x 代入下圖電路，求 branch current $i_1 =$ _

$$v_1' = 2 = 6 \times \frac{\frac{2R \cdot x}{2R+x}}{R + \frac{2R \cdot x}{2R+x}}$$

$$\Rightarrow \frac{1}{3} = \frac{2x}{2R+x+2x}$$

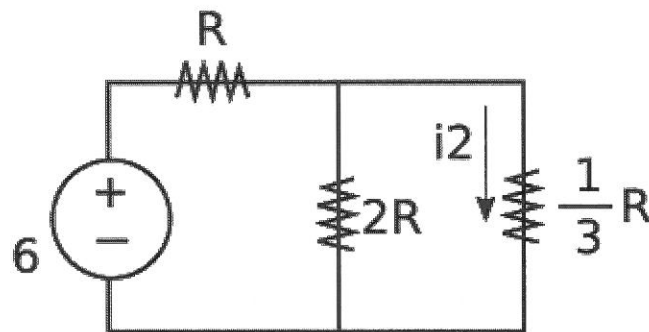
$$\Rightarrow 6x = 3x + 2R$$

$$\Rightarrow x = \frac{2}{3}R$$

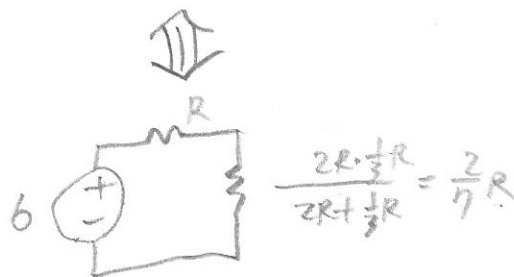


$$i_1 = \frac{4}{\frac{2}{3}R + \frac{1}{3}R} = \frac{4}{R} \quad \text{✗}$$

最後，在下圖電路中，求 branch current $i_2 =$ _



i_2 是否等於 i_1 ? Your answer here.



$$i_2 = \underbrace{\frac{6}{R + \frac{2}{7}R}}_{\text{ohm's law}} \times \underbrace{\frac{2}{2 + \frac{1}{3}}}_{\text{current divider}} = \frac{6}{\frac{9}{7}R} \times \frac{2}{\frac{7}{3}} = \frac{4}{R} \quad \text{✗}$$