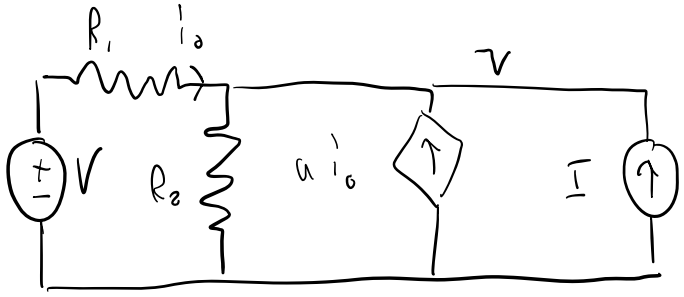
1



$$i_0 + \alpha i_0 + I = \frac{v}{R_2}$$

$$v + R_1 i_0 = V$$

$$\frac{V - v}{R_1}(1+\alpha) + I = \frac{v}{R_2}$$

$$i_0 = \frac{V - v}{R_1}$$

$$\frac{V}{R_1}(1+\alpha) + I = v\left(\frac{1}{R_2} + \frac{1+\alpha}{R_1}\right)$$

$$\frac{\frac{V(1+\alpha)}{R_1} + I}{\frac{1}{R_2} + \frac{1+\alpha}{R_1}} = v$$

$$v = \frac{V(1+\alpha) + I R_1}{1 + R_1/R_2 + \alpha}$$

2

$$i_0 + \alpha i_0 = \frac{v}{R_2} \qquad v + R_1 i_0 = V \qquad i_0 = \frac{V - v}{R_1}$$

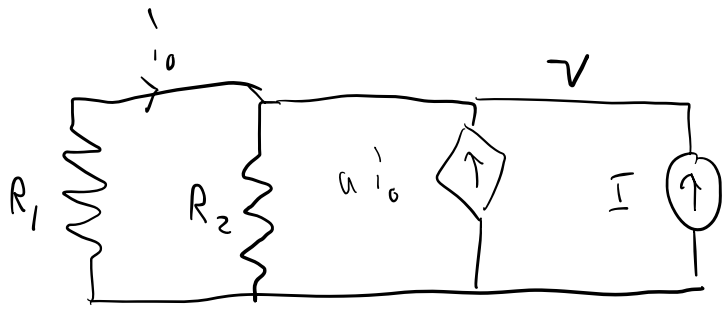
$$\frac{V - v}{R_1}(1+\alpha) = \frac{v}{R_2}$$

$$\frac{V}{R_1}(1+\alpha) = v\left(\frac{1}{R_2} + \frac{1+\alpha}{R_1}\right)$$

$$V(1+\alpha) = v\left(\frac{R_1}{R_2} + 1 + \alpha\right)$$

$$v = \frac{V(1+\alpha)}{1 + R_1/R_2 + \alpha}$$

(3)



$$i_0 + \alpha i_0 + I = \frac{v}{R_2}$$

$$v = -i_0 R_1 \qquad i_0 = -\frac{v}{R_1}$$

$$-\frac{v}{R_1}(1+\alpha) + I = \frac{v}{R_2} \qquad I R_1 = v\left(\frac{R_1}{R_2} + 1 + \alpha\right)$$

$$-v(1+\alpha) + I R_1 = \frac{v R_1}{R_2}$$

$$\boxed{v = \frac{I R_1}{1 + R_1/R_2 + \alpha}}$$

(4)

$$\frac{V(1+\alpha)}{1 + R_1/R_2 + \alpha} + \frac{I R_1}{1 + R_1/R_2 + \alpha} = \boxed{\frac{V(1+\alpha) + I R_1}{1 + R_1/R_2 + \alpha}}$$

(5) $I = 0 \rightarrow$

$$\boxed{V_{th} = \frac{V(1+\alpha)}{1 + R_1/R_2 + \alpha}}$$

$v = 0 \rightarrow \quad 0 = V(1+\alpha) + I R_1 \qquad I = -\dfrac{V(1+\alpha)}{R_1}$

$V_{th} = -I R_{th}$

$$\boxed{R_{th} = \frac{R_1}{1 + R_1/R_2 + \alpha}}$$