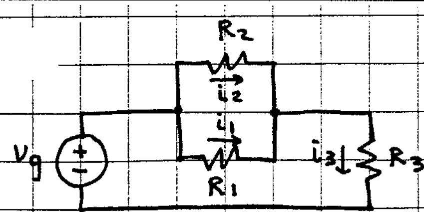
ex:



v_g, R_2, R_3 fixed nonzero vals

Explain how i_3 would change as R_1 ranged from 0 to ∞.
" " i_1 & i_2 " " " " " " " "

sol'n: R_1 and R_2 form <u>current divider</u> for current i_3.

$$\therefore \quad i_1 = i_3 \cdot \frac{R_2}{R_1+R_2} \qquad i_2 = i_3 \cdot \frac{R_1}{R_1+R_2}$$

$$\text{Also,} \quad i_3 = \frac{v_g}{\text{tot } R} = \frac{v_g}{R_1 \| R_2 + R_3}.$$

$$\text{Now,} \quad R_1 \| R_2 = 0 \quad (R_1 = 0) \qquad R_1 \| R_2 + R_3 = R_3 \quad (R_1 = 0)$$
$$= R_2/2 \quad (R_1 = R_2) \qquad = R_2/2 + R_3 \quad (R_1 = R_2)$$
$$= R_2 \quad (R_1 = \infty) \qquad = R_2 + R_3 \quad (R_1 = \infty)$$

$$\text{Thus,} \quad i_3 = \frac{v_g}{R_3} \quad (R_1 = 0)$$
$$= \frac{v_g}{\frac{R_2}{2} + R_3} \quad (R_1 = R_2)$$
$$= \frac{v_g}{R_2 + R_3} \quad (R_1 = \infty)$$

$$i_1 = \frac{i_3 R_2}{0 + R_2} = 1 \cdot i_3 \quad (R_1 = 0) \qquad i_2 = i_3 \cdot \frac{0}{0 + R_2} = 0$$

$$i_1 = i_3 \frac{R_2}{R_2 + R_2} = \frac{i_3}{2} \quad (R_1 = R_2) \qquad i_2 = i_3 \frac{R_2}{R_2 + R_2} = \frac{i_3}{2}$$

$$i_1 = i_3 \frac{R_2}{\infty + R_2} = 0 \quad (R_1 = \infty) \qquad i_2 = i_3 \frac{\infty}{\infty + R_2} = i_3$$

use L'Hopital's rule