# Equivalent Circuits

Please send corrections (or suggestions) to youngwlim@hotmail.com.

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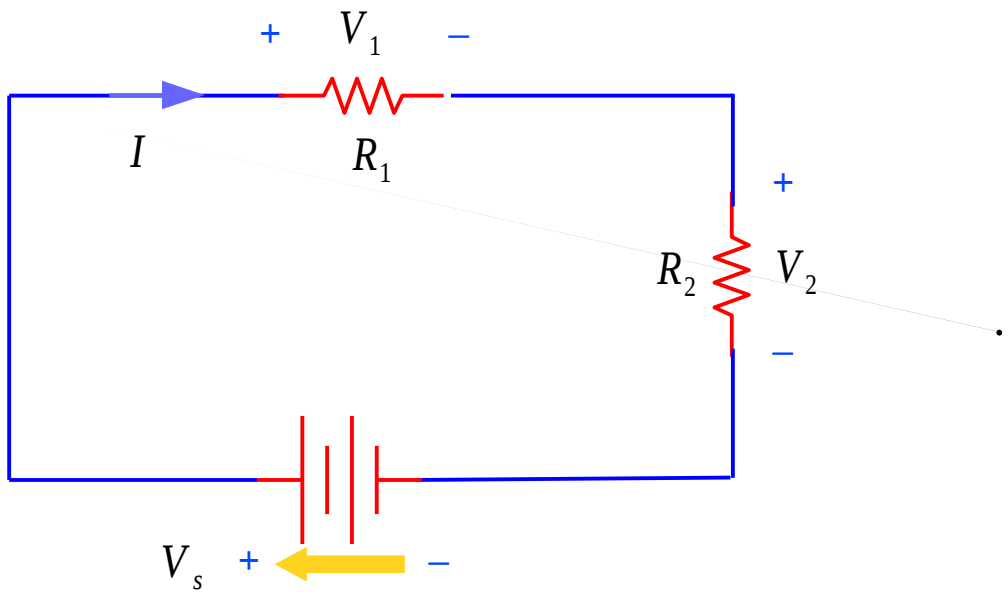
# Voltage Divider

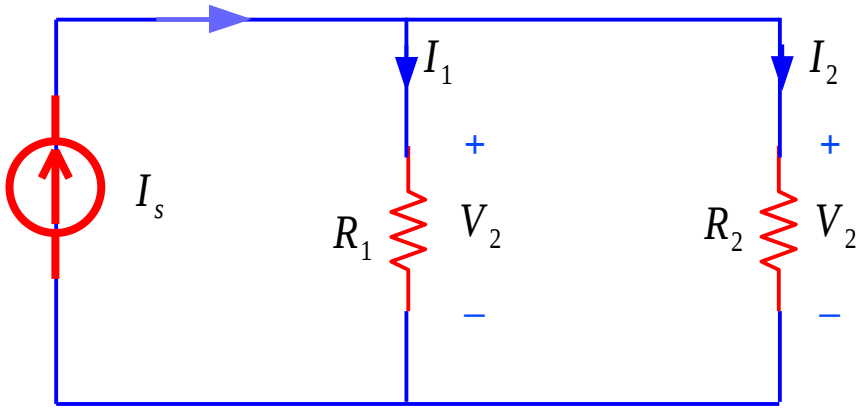



$$V_1 : V_2 = R_1 : R_2$$

$$V_1 = \left(\frac{R_1}{R_1+R_2}\right) V_s$$

$$V_2 = \left(\frac{R_2}{R_1+R_2}\right) V_s$$

# Current Divider

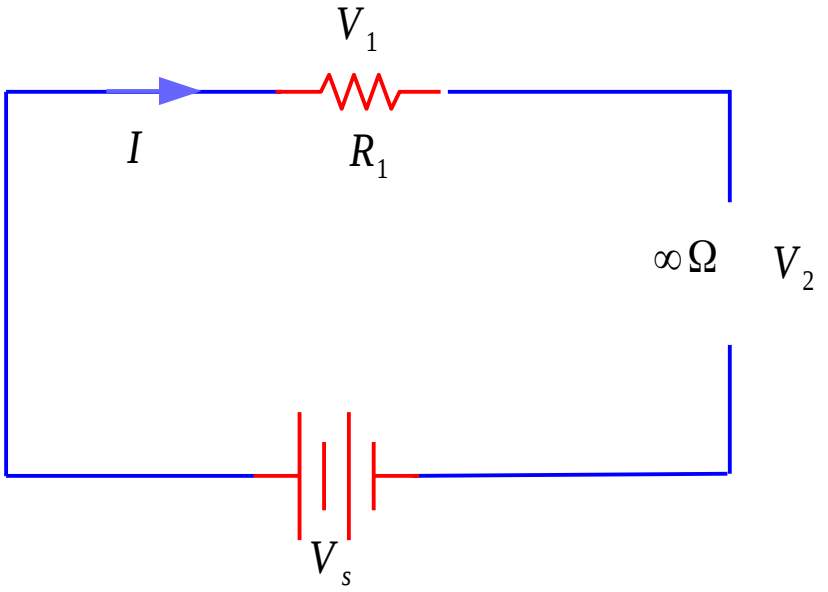


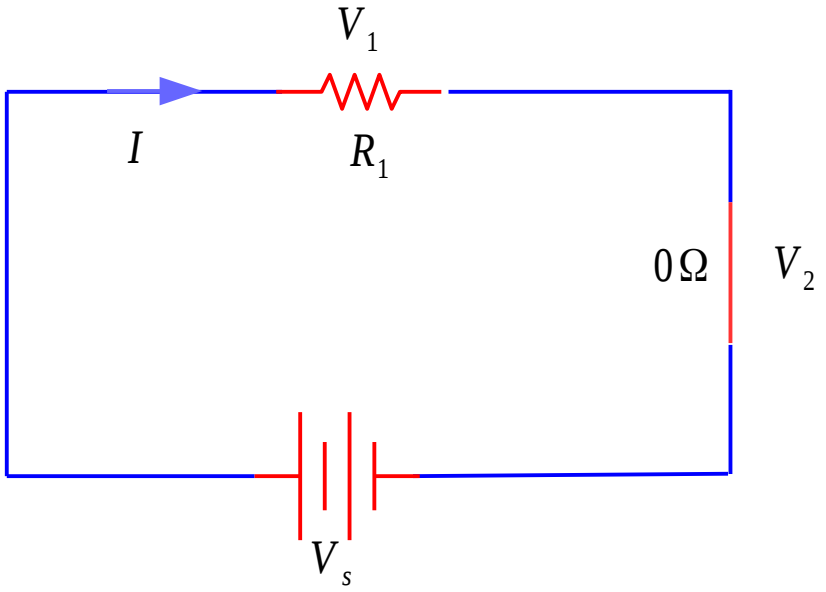

$$I_1 : I_2 = R_2 : R_1$$

$$I_1 = \left( \frac{R_2}{R_1 + R_2} \right) I_s$$

$$I_2 = \left( \frac{R_1}{R_1 + R_2} \right) I_s$$

# Max Voltage



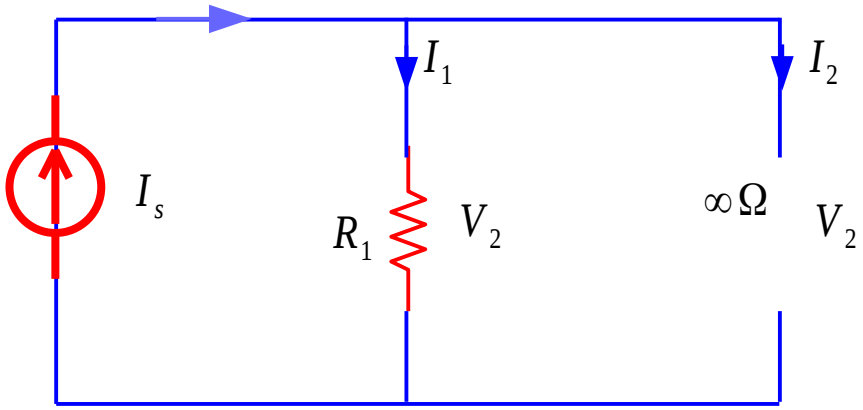



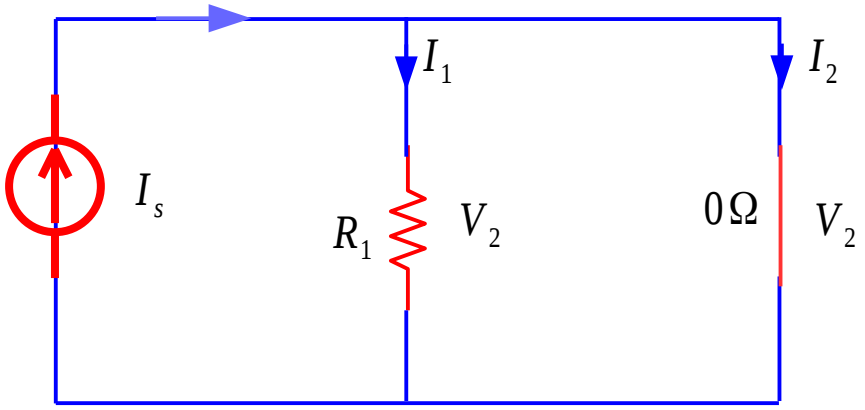

$$V_1 = \left(\frac{R_1}{R_1+\infty}\right)V_s = 0$$
$$V_2 = \left(\frac{\infty}{R_1+\infty}\right)V_s = V_s$$

$$V_1 = \left(\frac{R_1}{R_1+0}\right)V_s = V_s$$
$$V_2 = \left(\frac{0}{R_1+0}\right)V_s = 0$$

$$0 \le V_2 \le V_s$$ max voltage

# Max Current




$$I_1 = \left(\frac{\infty}{R_1+\infty}\right) I_s = I_s$$

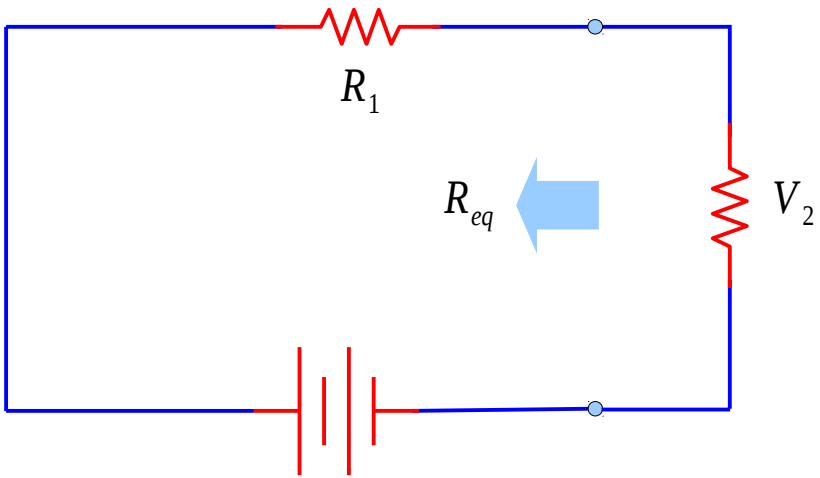
$$I_2 = \left(\frac{R_1}{R_1+\infty}\right) I_s = 0$$

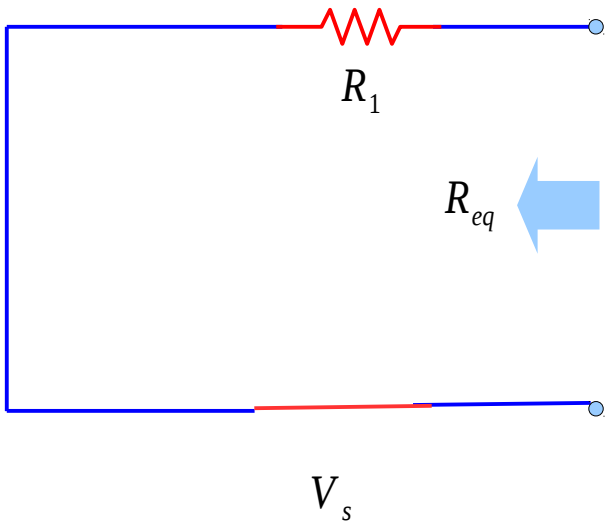
$$I_1 = \left(\frac{0}{R_1+0}\right) I_s = 0$$

$$I_2 = \left(\frac{R_1}{R_1+0}\right) I_s = I_s$$

$$0 \le I_2 \le I_s$$ max current

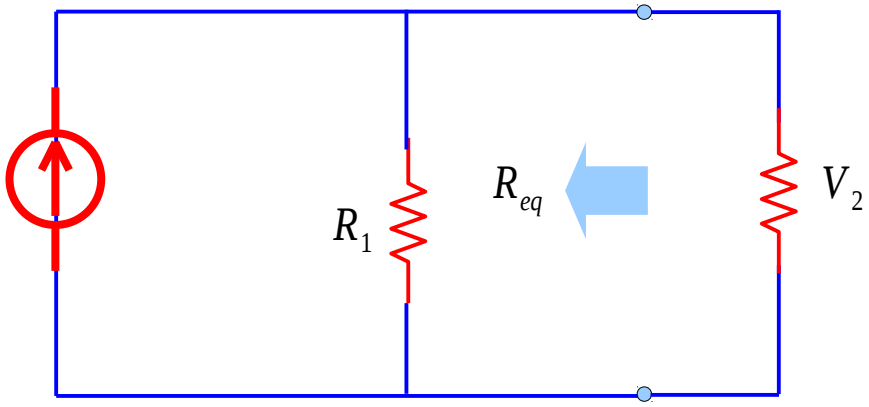
# Equivalent Resistance

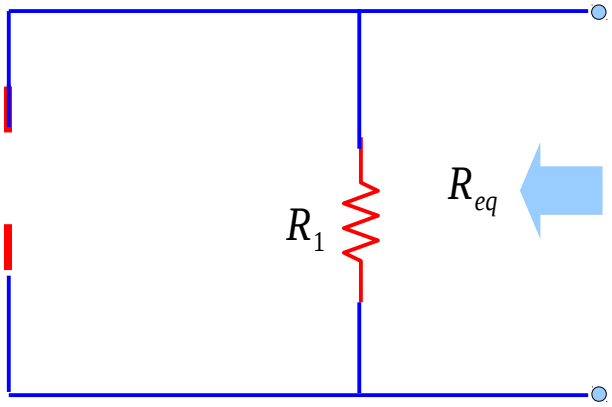



$$R_{eq} = R_1$$

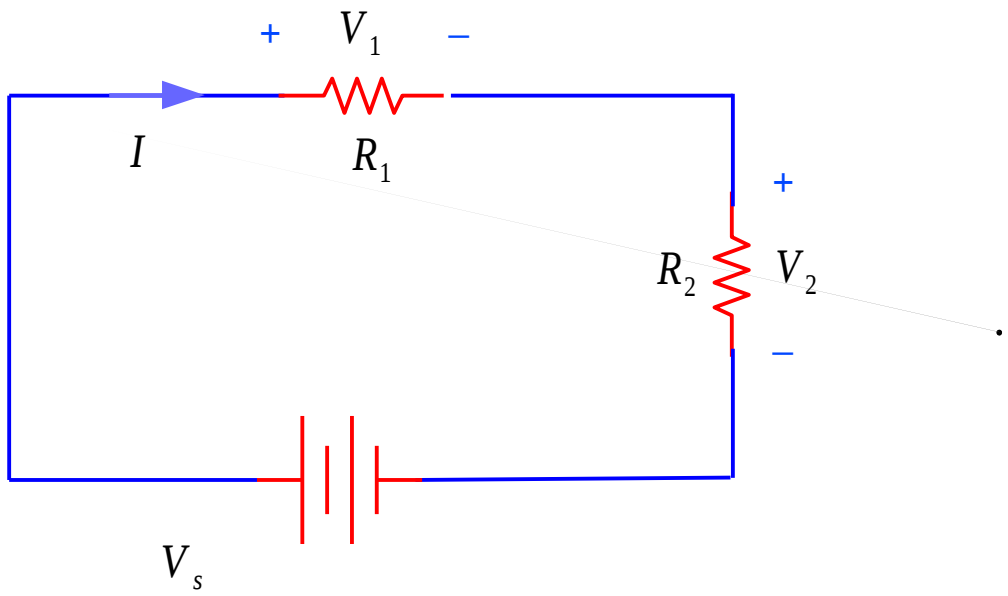
# Equivalent Resistance




$$R_{eq} = R_1$$

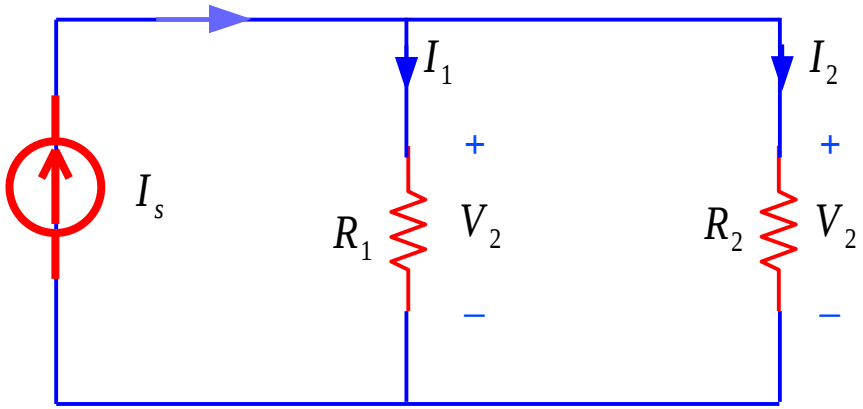
# Thevenin's Voltage Divider




$$V_2 = \left( \frac{R_2}{R_{eq} + R_2} \right) V_s$$

divided max voltage

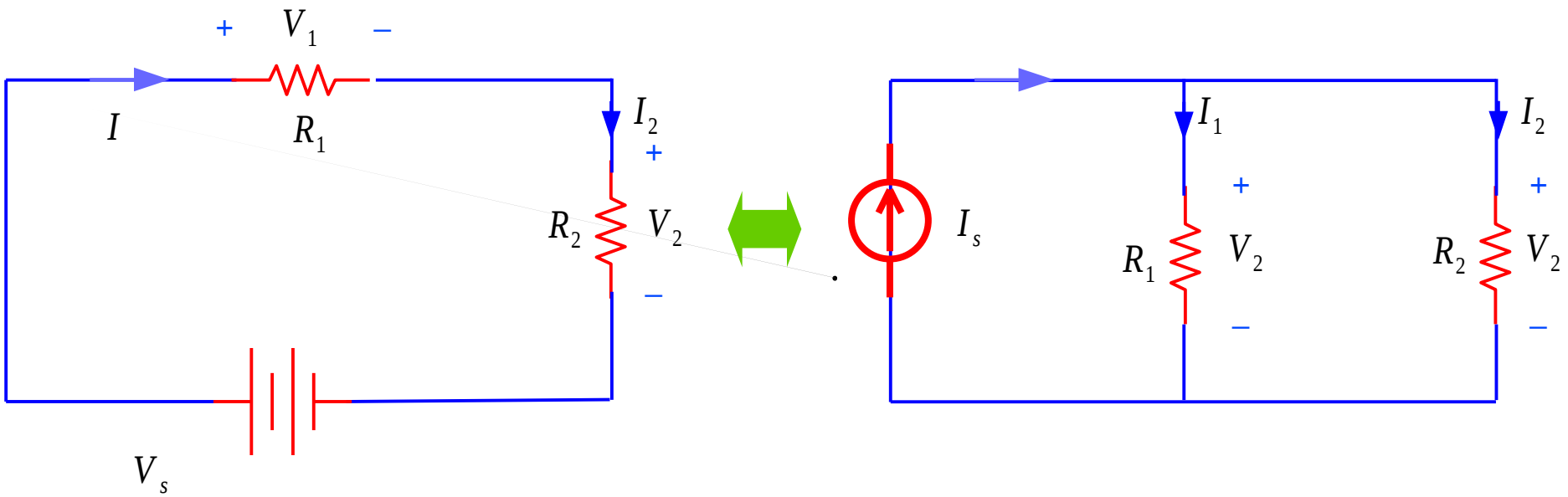
# Norton's Current Divider




$$I_2 = \left(\frac{R_{eq}}{R_{eq}+R_2}\right) I_s$$

divided max current

# Thevenin and Norton Theorems




$$V_2 = \left(\frac{R_2}{R_{eq}+R_2}\right)V_s \qquad I_2 = \left(\frac{R_{eq}}{R_{eq}+R_2}\right)I_s$$

$$V_s = R_{eq} \cdot I_s$$

## References

[1] http://en.wikipedia.org/
[2] www.allaboutcircuits.com
[3]