

Lecture 3

Reminder:

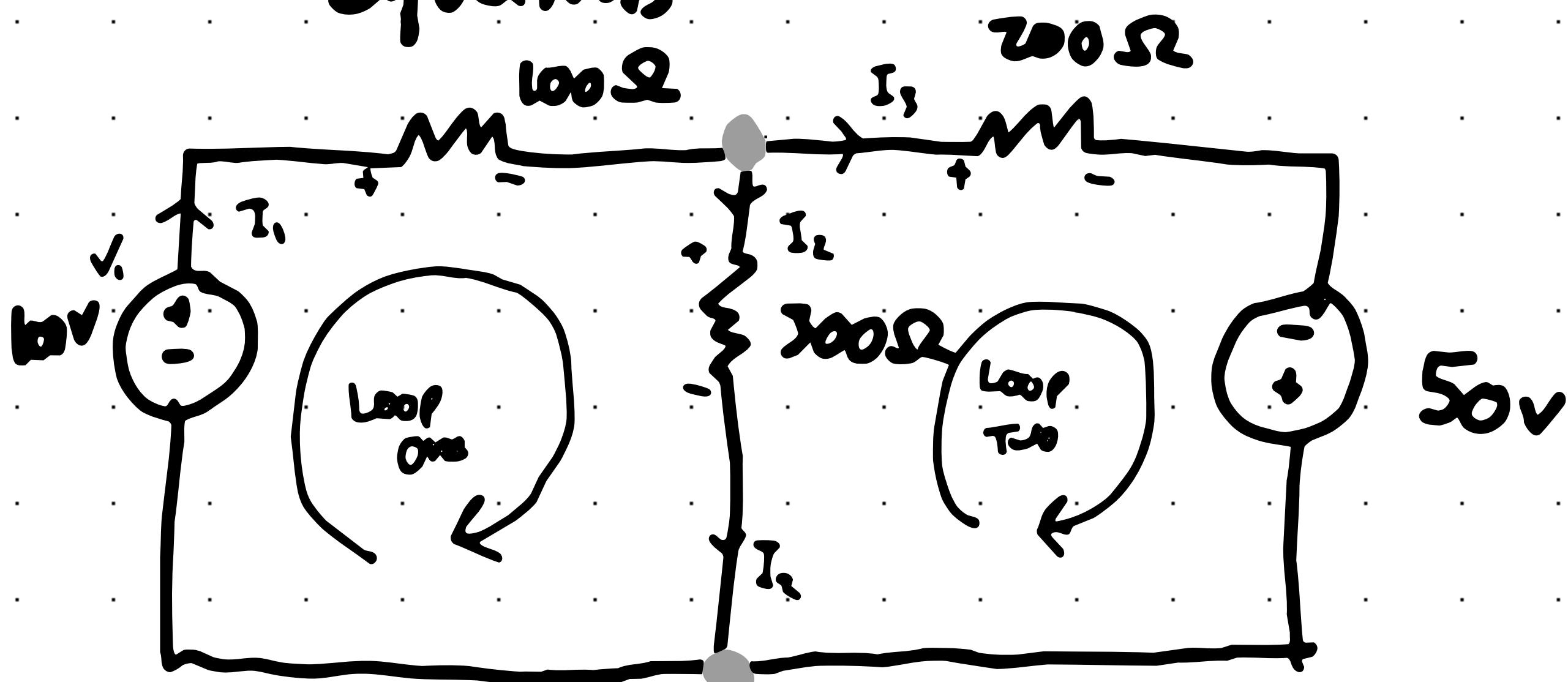
KCL

$$\sum I = 0$$

KVL

$$\sum V = 0$$

Ex Write the Current and voltage equations



Warning! The direction doesn't matter, but if your answers come out negative, the assumptions isn't right.

Equation One:

$$V = IR$$

$$I_1 - I_2 - I_3 = 0$$

Equation Two: Loop one

$$100 - 100I_1 - 300I_2 = 0$$

Equation Three

$$300I_2 - 200I_3 + 50 = 0$$

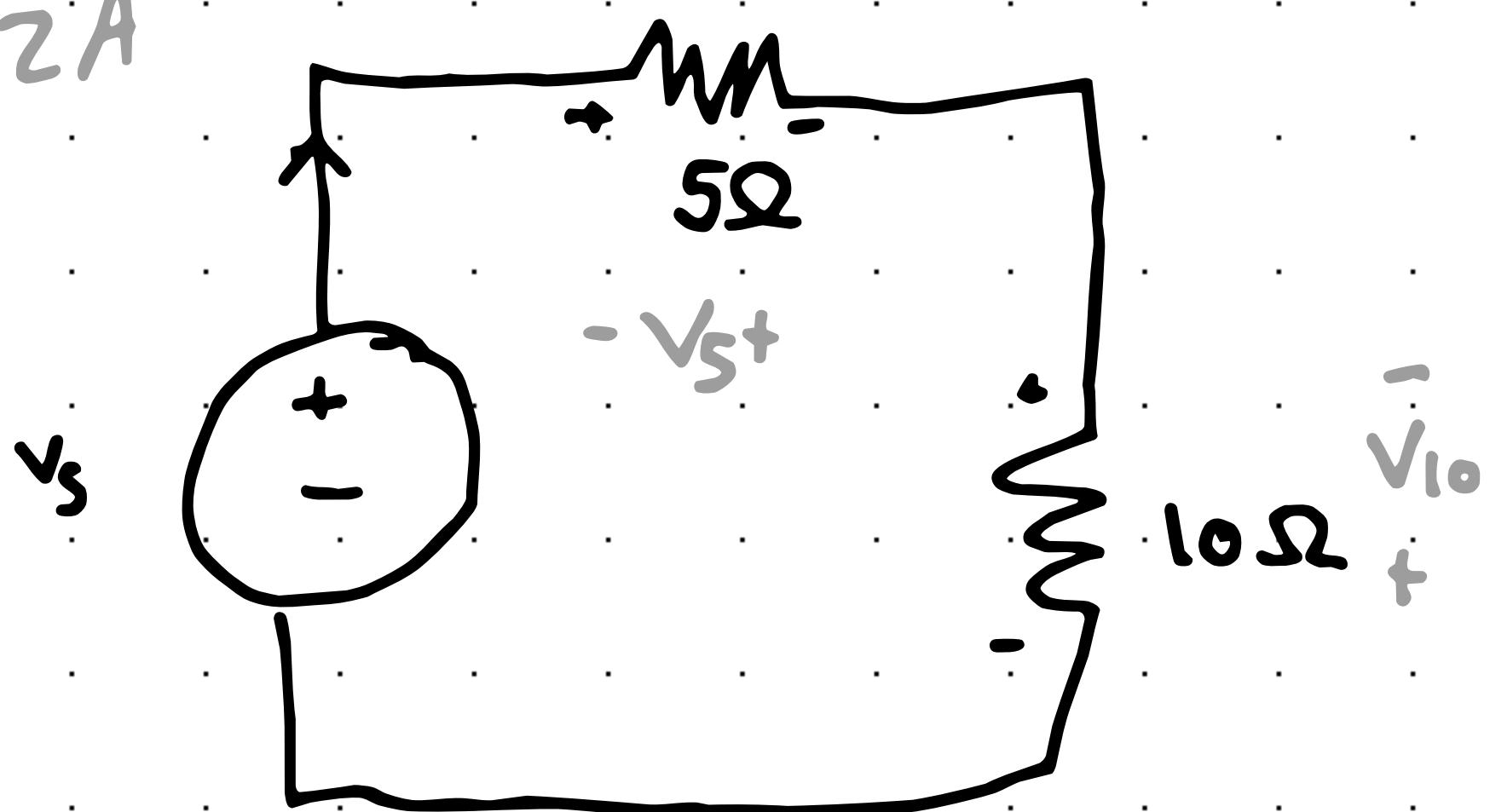
If we used the outer loop... (resistor)

$$100 - 100I_1 - 200I_3 + 50 = 0$$

Either use two inner
or one inner, and
one outer.

Calculate the value of V_s and V_5 and V_{10}

$$i = 2A$$



This guy is
easy for opposite
voltages from the
voltages!

$$\sum V = 0$$

$$V_s - 5\Omega i - 10\Omega i = 0$$

(1) (2)

$$V_s = 30V$$

$$V_5 = 10V$$

$$V_{10} = 20V$$

and for reverse
voltages!

$$V_s = 30V$$

$$V_5 = -10V$$

$$V_{10} = -20V$$

Power

$$P = VI = I^2 R = \frac{V^2}{R}$$

If P is $+$, the power is Absorbed

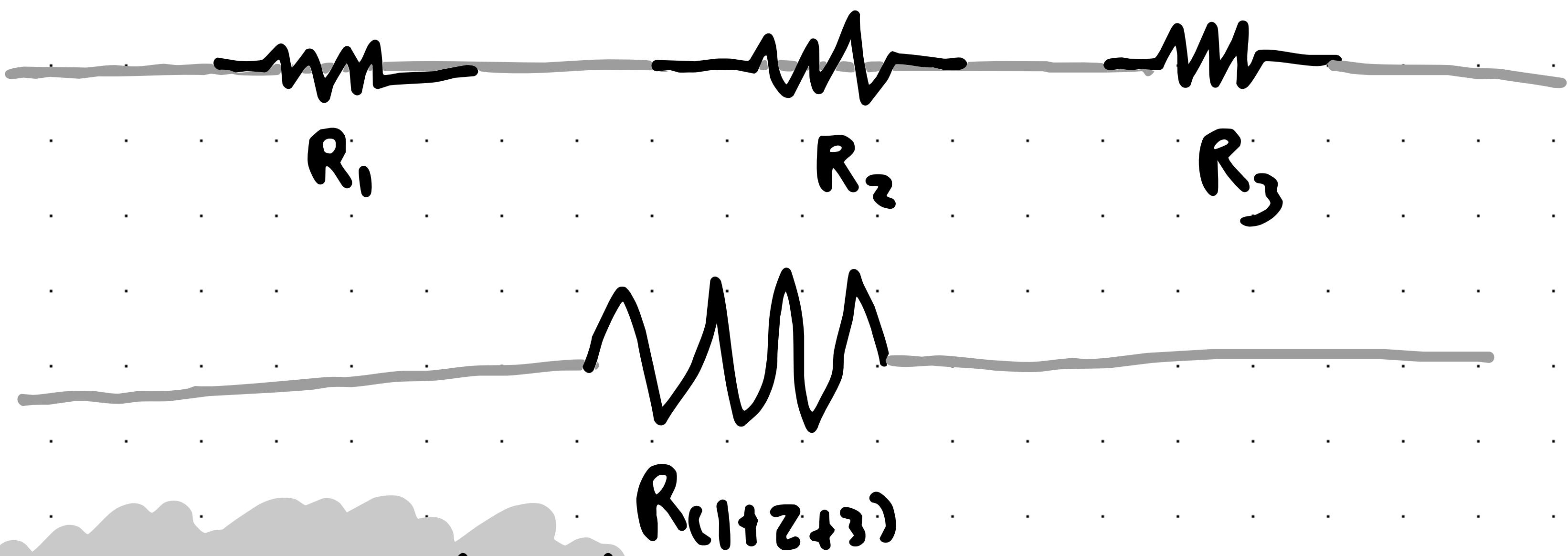
If P is $-$ the power is generated

Just a
Reminder!!!!



Resistor Networks

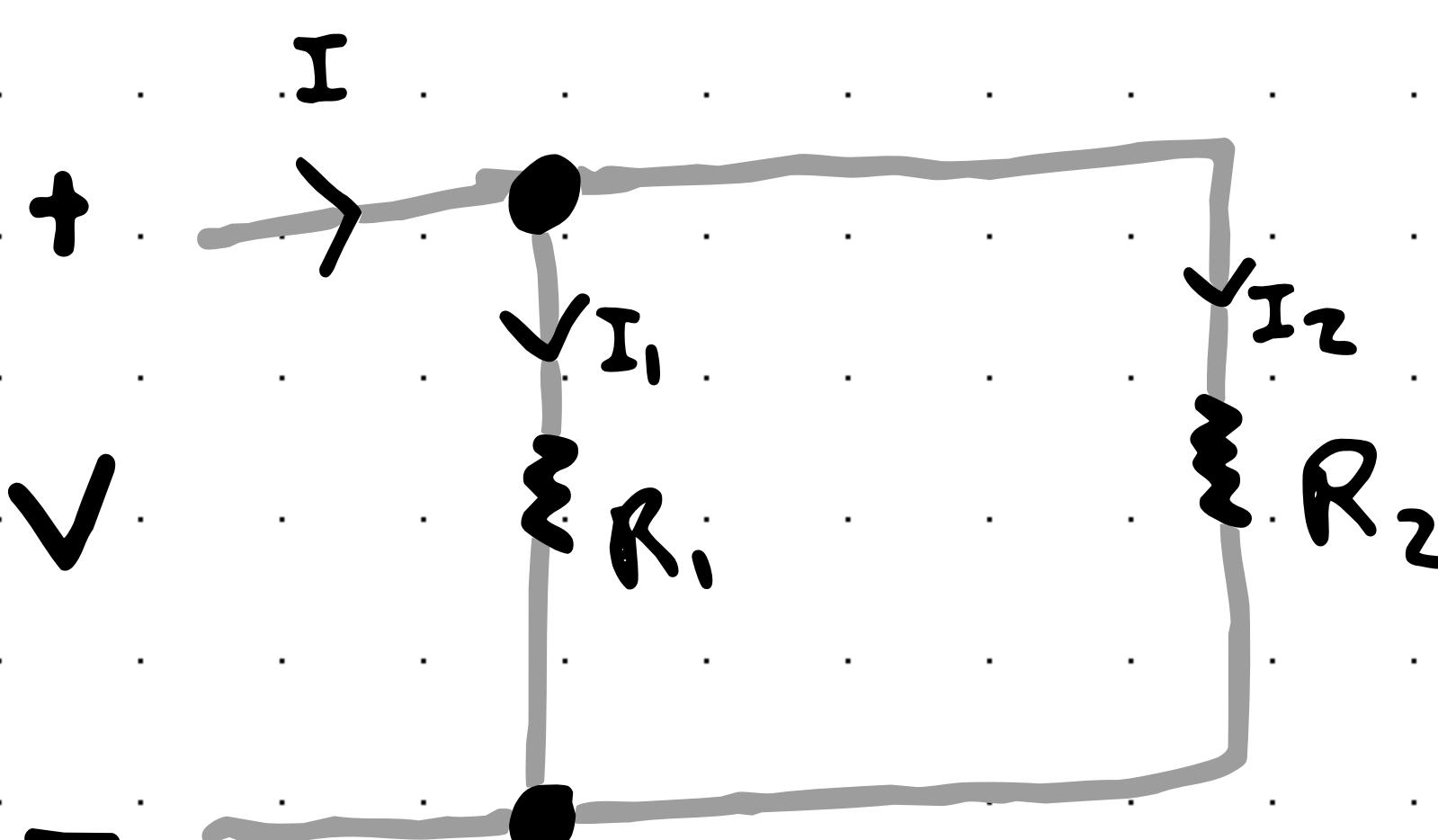
In Series...



It's the same thing!!

Remember to sum resistors in series

In parallel...



$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$$

R_T = Total Equivalent Resistance

For any resistor connected in parallel,

$$\frac{1}{R_T} = \sum_{i=1}^n \frac{1}{R_i}$$

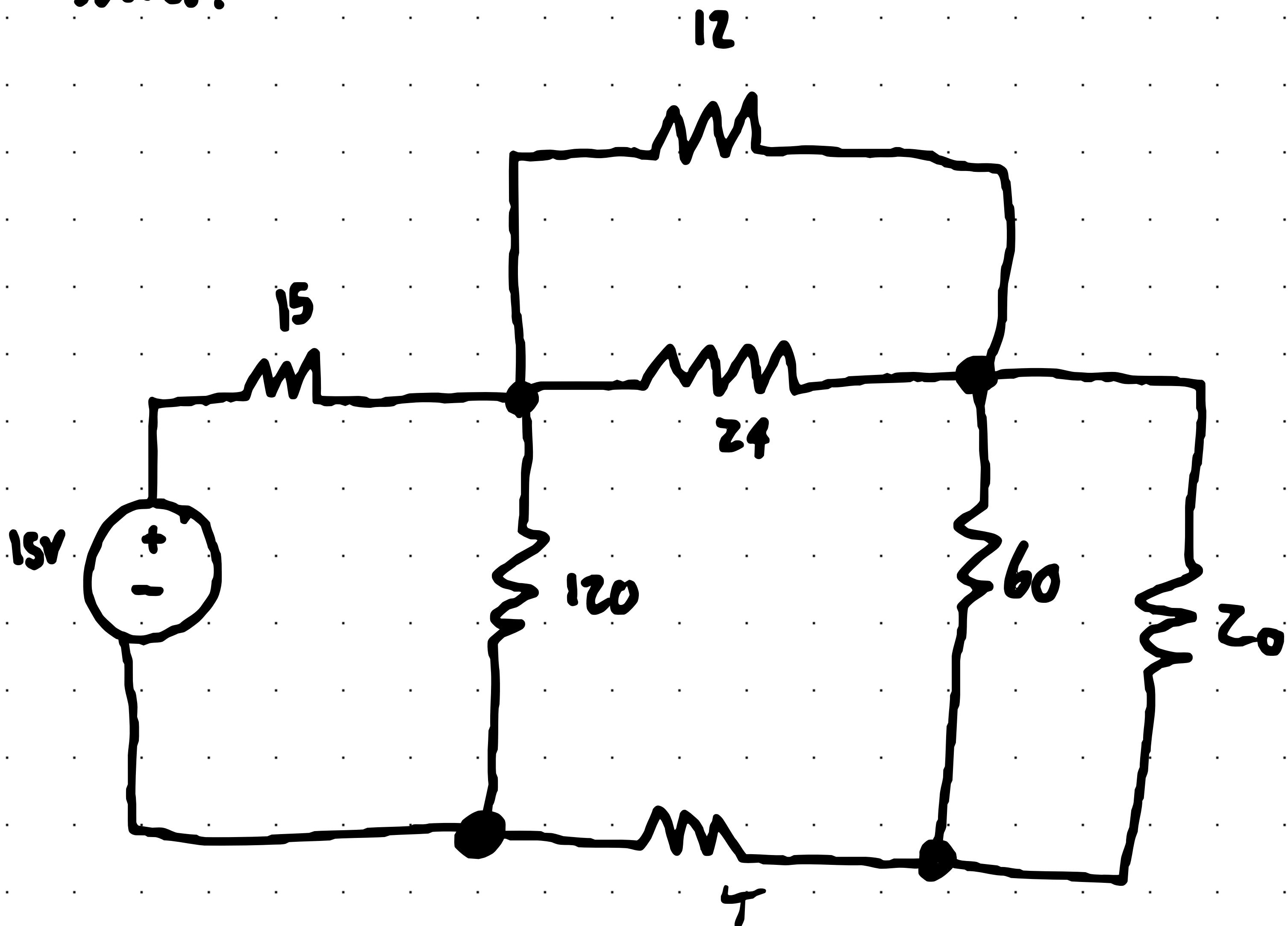
Quick trick for only two resistors!

(in parallel)

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{R_2 + R_1}{R_1 R_2} \quad (\text{like denominators})$$

$$R_t = \frac{R_1 R_2}{R_1 + R_2}$$

Find the equivalent resistance seen by the voltage source.

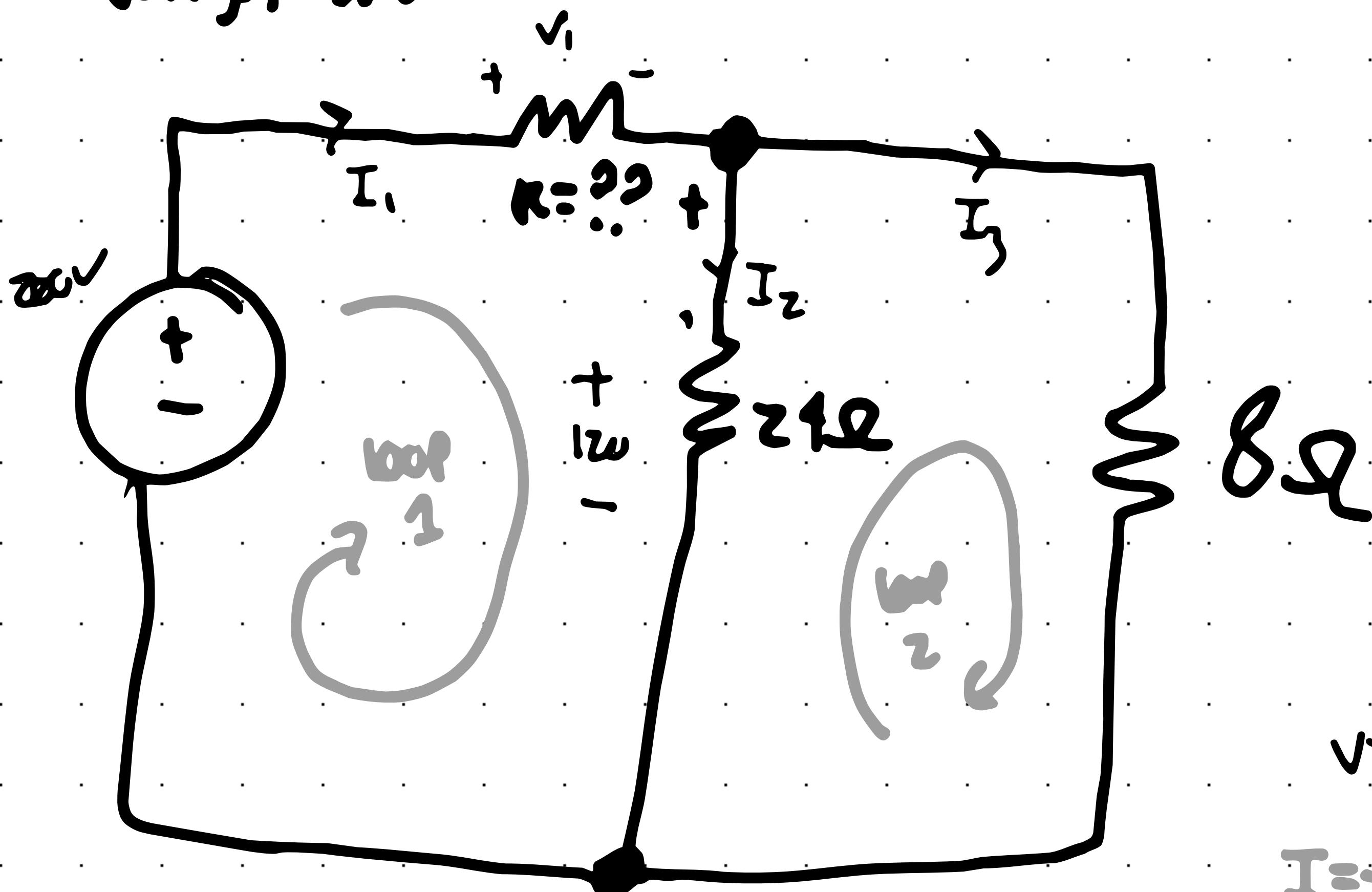


use the resistor formula!

$$R_T = 39\Omega$$

Use KVL and KCL to solve the following problem

Plot the value of R_1 and find the unknown voltages, and currents.



$$V = IR$$

$$I = \frac{V}{R}$$

v with
just one
voltage /
source!

$$I_1 - I_2 - I_3 = 0$$

$$\frac{R_1 R_2}{R_1 + R_2}$$

$$200 - I_1 R_1 - 120 = 0$$

$$-24I_2 - 8I_3 = 0$$

$$V = I_2 R_2$$

$$120 = I_2 24$$

$$-24I_2 - 8I_3 = 0$$

$$I_2 = 5A$$

$$I_3 = 1.5A$$

$$I_1 = 20A$$

$$R_1 = 12\Omega$$

$$V_1 = 80V$$