

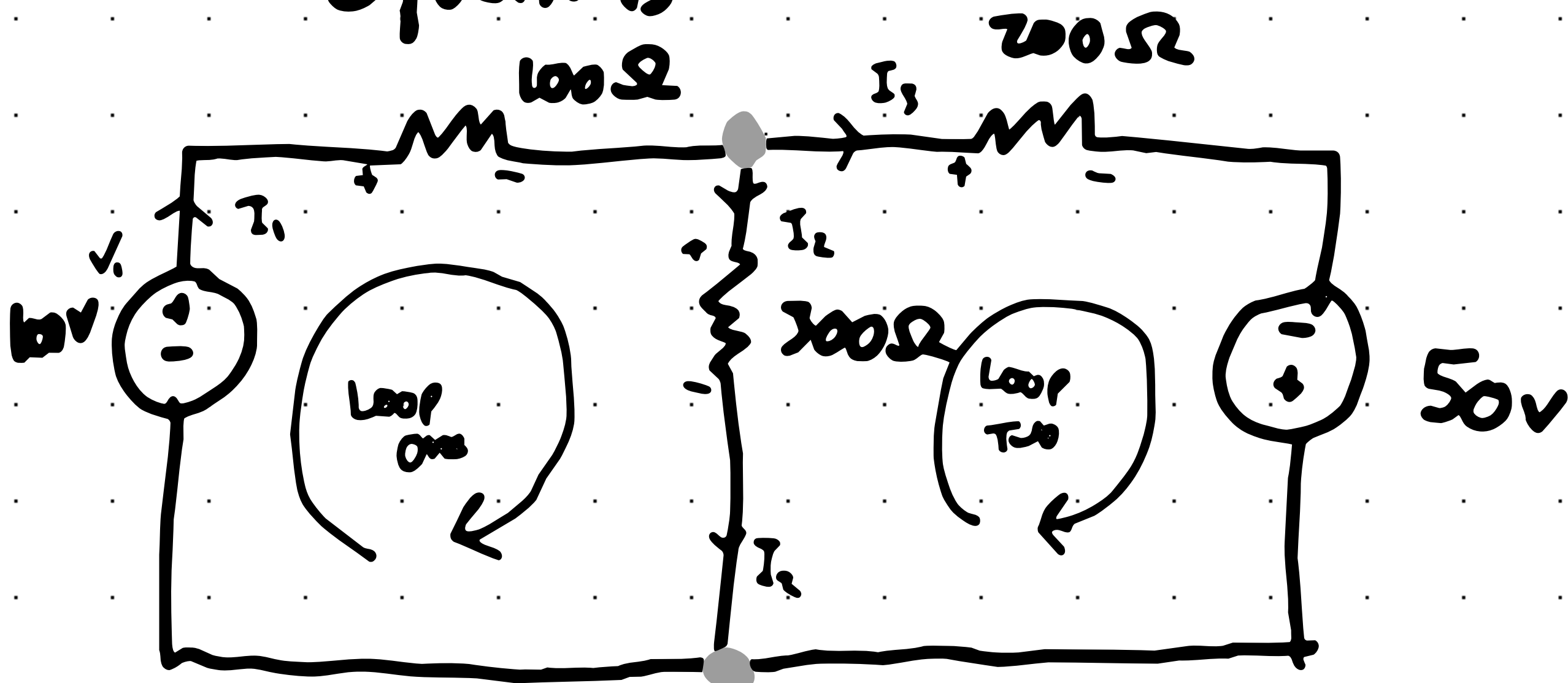
# Lecture 3

Reminder:

$$KCL \quad \sum I = 0$$

$$KVL \quad \sum V = 0$$

Ex = Write the current and voltage equations



Reminder! In direction doesn't matter, but if your assumption comes out negative, the assumption 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

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

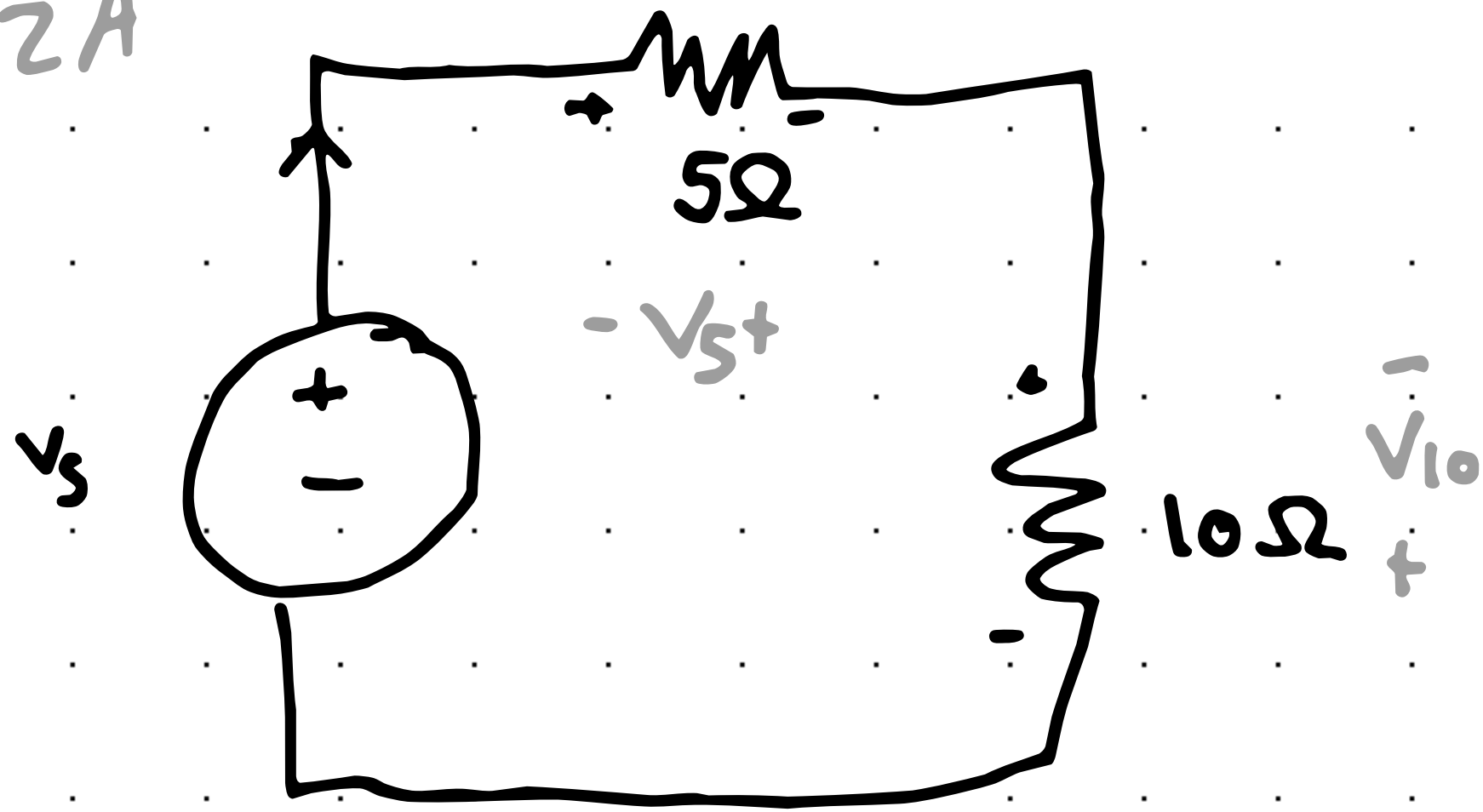
If we used the outer loop... (Redundant)

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

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

Calculate the values of  $V_5$  and  $V_5$  and  $V_{10}$

$$i = 2A$$



This gives is  
a sign for opposite  
potentials from the  
voltages!

$$\sum v = 0$$

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

$$V_s = 30V$$

$$V_5 = 10V$$

$$V_{10} = 20V$$

and for reverse  
potentials!

$$V_s = 30V$$

$$V_5 = -10V$$

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

# Power

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

If  $P$  is  $\oplus$ , the power is Absorbed

If  $P$  is  $\ominus$ , the power is Generated

Just a  
Reminder!!!!



# Resistor Networks

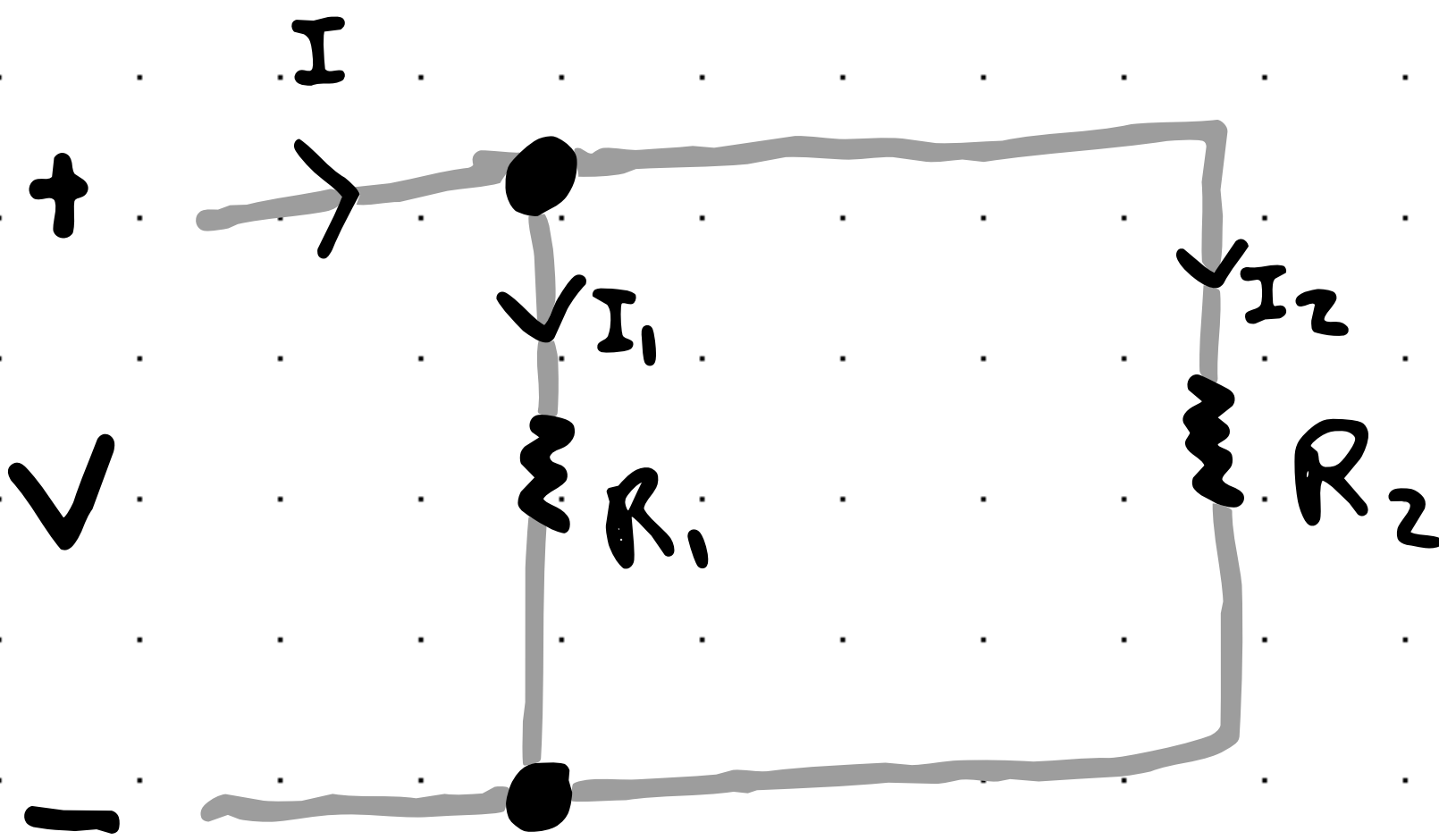
In Series...



It's the same thing!!

Remember to sum resistors in series

In parallel...



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

For any resistor connected in parallel,

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

$R_T$  = Total Equivalent Resistance

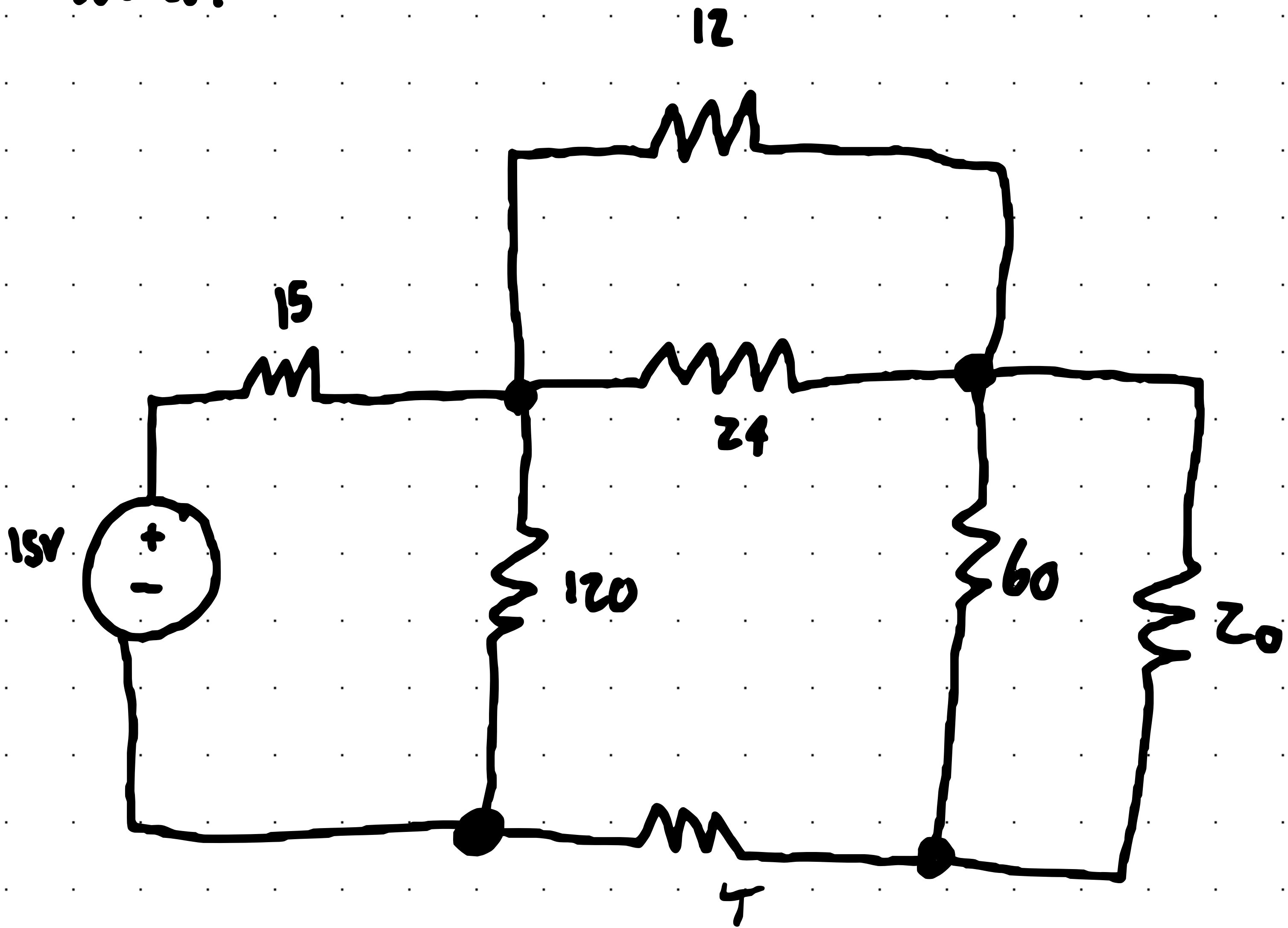
# Quick trick for only two resistors!

(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.

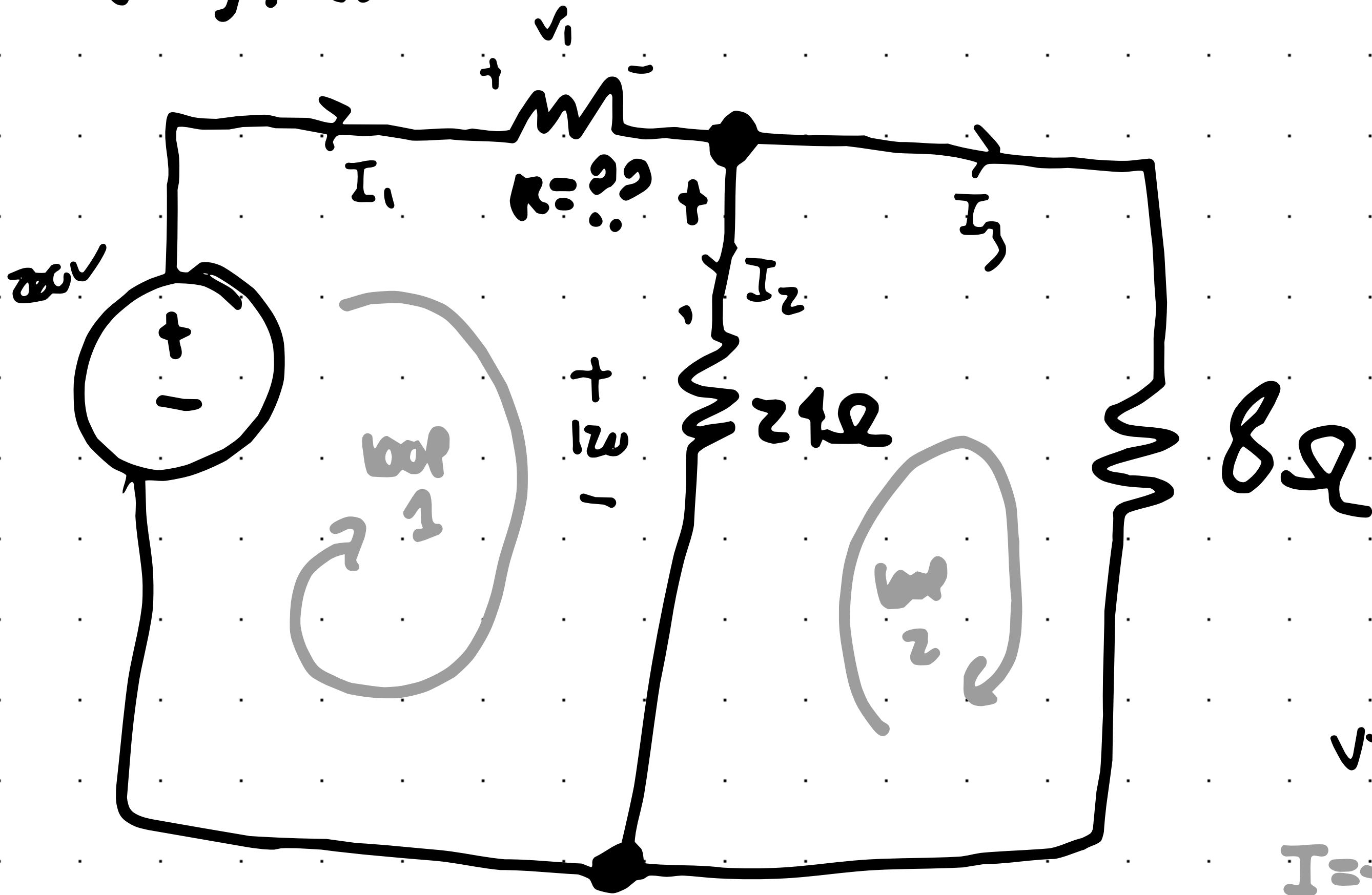


use the resistor rules!

$$R_T = 39\Omega$$

Use KVL and KCL to solve the following problem

Find the value of  $R_1$ , and find the unknown voltages, and currents.



$V = IR$   
 $I = \frac{V}{R}$   
 v with just one voltage source!

$$I_1 - I_2 - I_3 = 0$$

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

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

$$-24(5) = 8I_3$$

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

$$V = I_2 R_2$$

$$120 = I_2 24$$

$$I_2 = 5A$$

$$I_3 = 15A$$

$$I_1 = 20A$$

$$R_1 = 9\Omega$$

$$V_1 = 80V$$