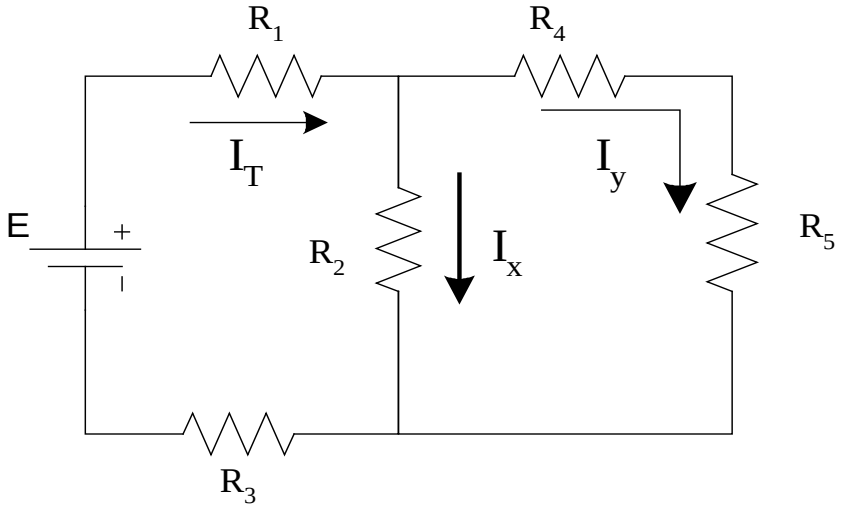
EE301 **Solving Series Parallel Problems**



What do we know?

R1 and R3 have the same current (I_T) and are in series.
R4 and R5 have the same current (I_y) and are in series.
R2 is in parallel with Ry (R4+R5)
R2 has the same voltage drop as Ry (R4+R5) (KVL)

$I_T = I_y + I_x$ (KCL)

$$I_T = \frac{E}{R_T}\left(\text{Ohm's Law}\right)$$

$$R_{\text{series}} = R_1 + R_3$$

$$R_{\text{parellel}} = \left[R_2 \,||\, \left(R_4 + R_5\right)\right] = \frac{1}{\frac{1}{R_2} + \frac{1}{\left(R_4 + R_5\right)}}$$

$$R_T = R_{\text{series}} + R_{\text{parellel}}$$

$E = V_{R1} + V_{R2} + V_{R3}$ or $E = V_{R1} + V_{R3} + V_{R4} + V_{R5}$ (KVL)

$V_{R1} = I_T R_1, \quad V_{R3} = I_T R_3$

$$I_y = I_T \frac{R_{parellel}}{R_y} = I_T \frac{R_2 \,||\, \left(R_4 + R_5\right)}{R_4 + R_5}\left(\text{Current Divider rule}\right)$$

$$I_x = I_T \frac{R_{parellel}}{R_x} = I_T \frac{R_2 \,||\, \left(R_4 + R_5\right)}{R_2}\left(\text{Current Divider rule}\right)$$

or $I_x = I_T - I_y$

$V_{R2} = V_{R4} + V_{R5}$ *or* $V_{R2} = I_x R_2$