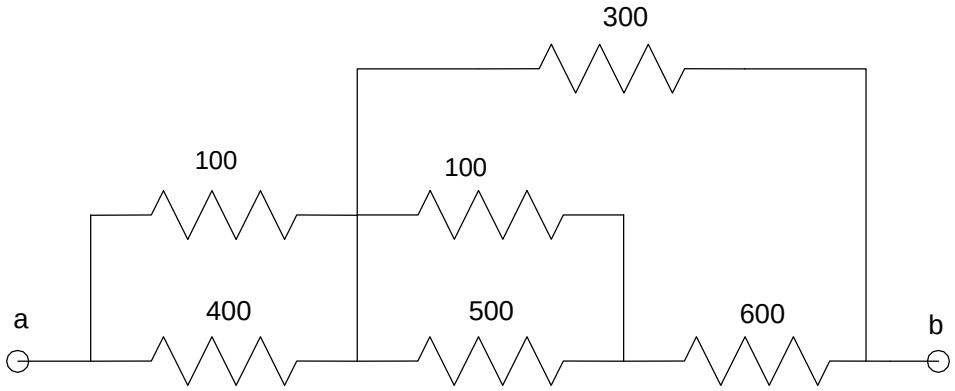
EE 206 Test #1b - Name _____

March 8, 2019

1a) Determine the resitance Rab

Rab = **288.47**



$100||400 = 80$

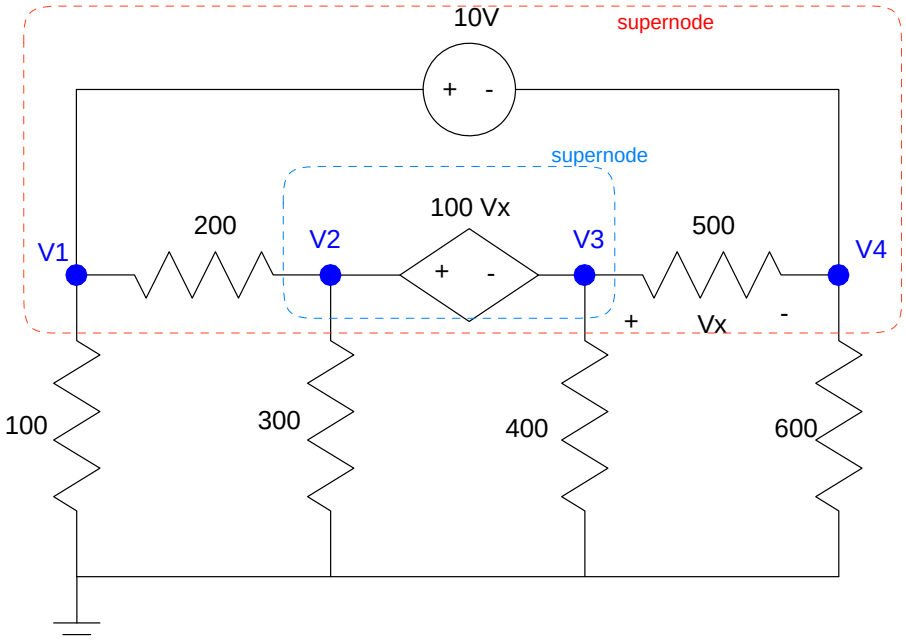
$100||500 = 83.33$

$83.33 + 600 = 683.33$

$683.33||300 = 208.47$

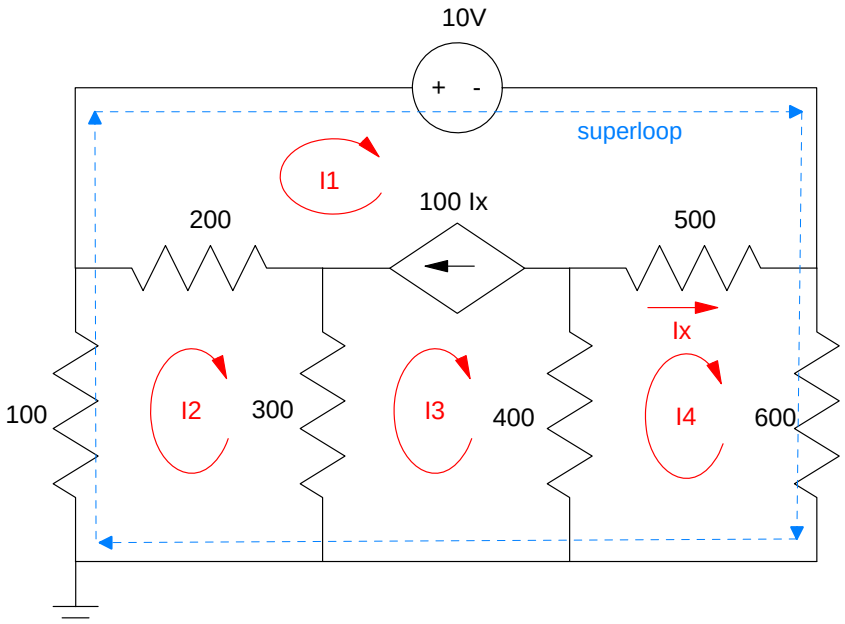
$80 + 208.47 = 288.47$

2) Write N equations to allow you to solve for the N unknown votlages



$V_1 - V_4 = 10$
$V_2 - V_3 = 100V_x$
$V_x = V_3 - V_4$
$\left(\frac{V_1}{100}\right) + \left(\frac{V_2}{300}\right) + \left(\frac{V_3}{400}\right) + \left(\frac{V_4}{600}\right) = 0$
$\left(\frac{V_2 - V_1}{200}\right) + \left(\frac{V_2}{300}\right) + \left(\frac{V_3}{400}\right) + \left(\frac{V_3 - V_4}{500}\right) = 0$

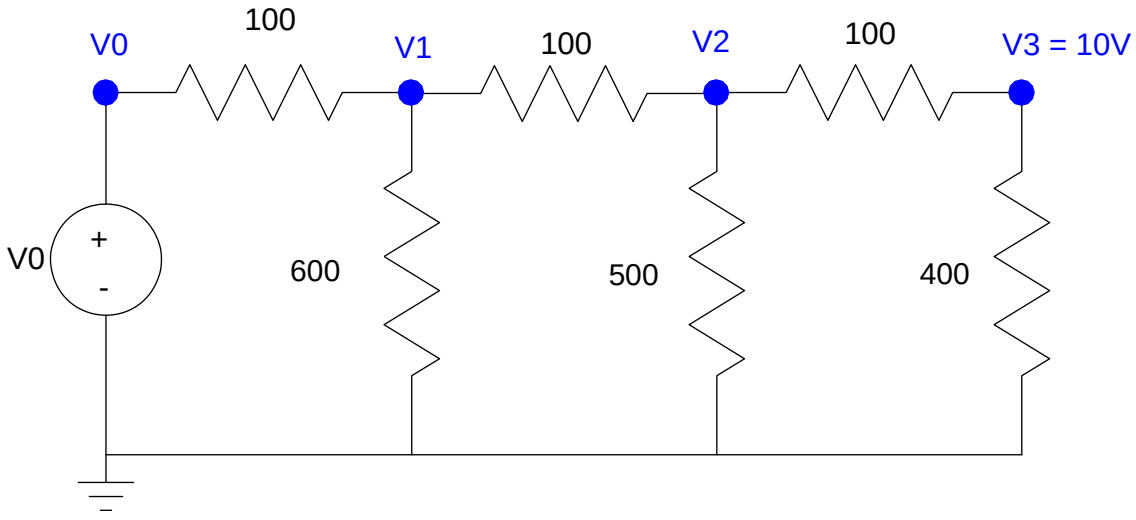
3) Write N equations to allow you to solve for the N unknown currents



$I_x = I_4 - I_1$
$100I_x = I_1 - I_3$
$100I_2 + 200(I_2 - I_1) + 300(I_2 - I_3) = 0$
$400(I_4 - I_3) + 500(I_4 - I_1) + 600I_4 = 0$
$100I_2 + 10 + 600I_4 = 0$

4) For the following circuit, the voltage at V3 is measured as 10V. Determine the voltages V0, V1, V2 (hint: use voltage division)

V0	V1	V2	V3
25.4 V	**17.5 V**	**12.5 V**	10.0V



$$V_3 = 10V = \left(\frac{400}{400+100}\right) V_2$$

$$V_2 = \left(\frac{400+100}{400}\right) 10V = 12.5V$$

$$500||500 = 250$$

$$V_2 = 12.5V = \left(\frac{250}{250+100}\right) V_1$$

$$V_1 = 17.5V$$

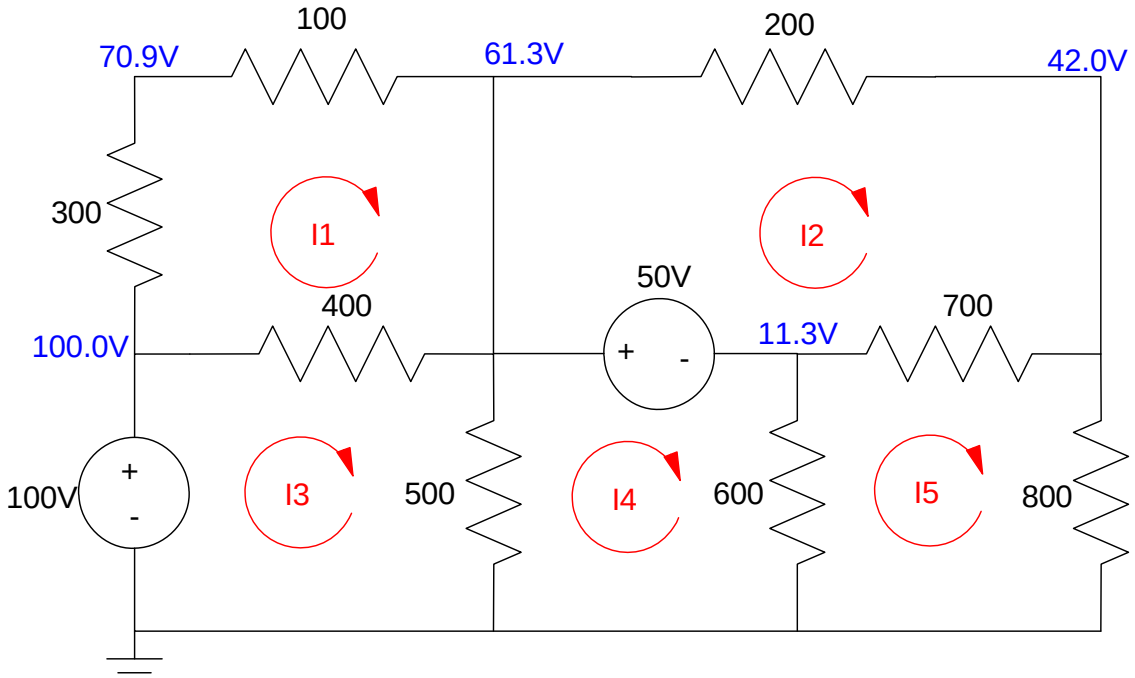
$$350||600 = 221$$

$$V_1 = 17.5V = \left(\frac{221}{221+100}\right) V_0$$

$$V_0 = 25.4V$$

5) Given the voltages, determine the loop currents

I1	I2	I3	I4	I5
97mA	**97mA**	**194mA**	**71mA**	**53mA**



$$I_1 = \left(\frac{100V - 70.9V}{300\Omega}\right) = 97mA$$

$$I_2 = \left(\frac{61.3V - 42.0V}{200\Omega}\right) = 97mA$$

$$I_5 = \left(\frac{42.0V - 0V}{800\Omega}\right) = 53mA$$

$$I_4 - I_5 = \left(\frac{11.3V}{600\Omega}\right) = 19mA$$

$$I_4 = 19mA + I_5 = 71mA$$

$$I_3 - I_1 = \left(\frac{100V - 63.3V}{400\Omega}\right) = 97mA$$

$$I_3 = I_1 + 97mA = 194mA$$