EE 206 Test #1c - Name _____

1) Kirchoff's Laws. Determine the unknown votlages

V1	V2	V3	V4	V5
21V	**16V**	**33V**	**22V**	**37V**
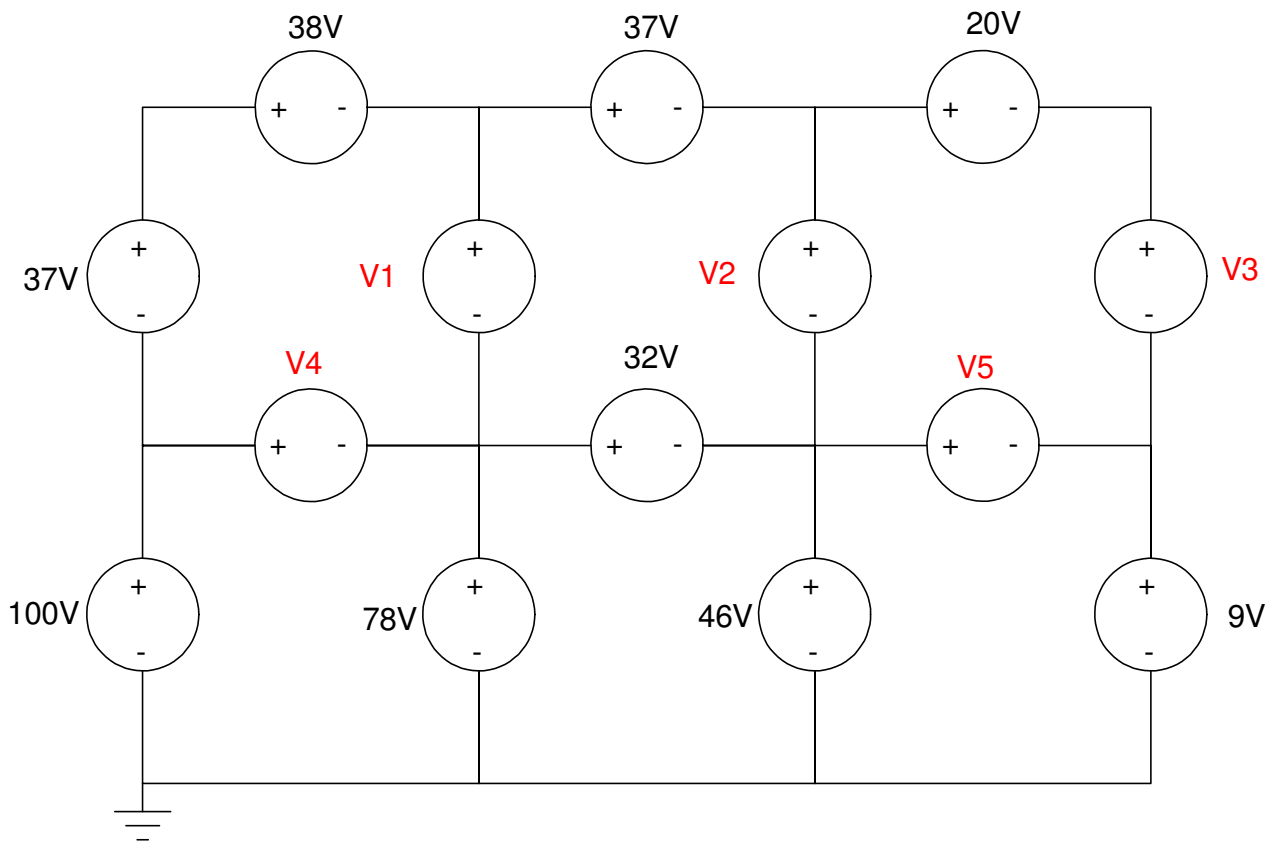
2) Determine the resitance Rab

Rab = 508.65 Ohms

720

700   120

a

510   570   650   540

1220 Ohms   98.18 Ohms

444.79 Ohms
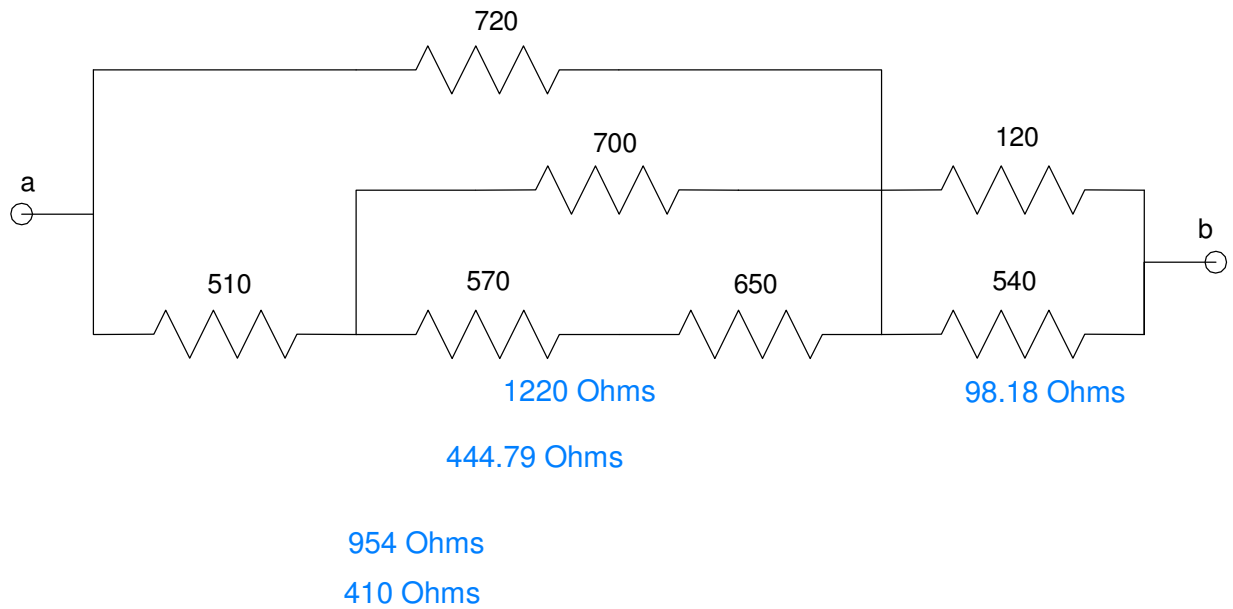
954 Ohms

410 Ohms

570 + 650 = 1220 Ohms

1220 || 700 = 444.79 Ohms

444.79 + 510 = 954 Ohms

954 || 720 = 410 Ohms

540 || 120 = 98 Ohms

410 + 98 = 508.65 Ohms

3) Voltage Division. Use voltage division to determine the voltages V1 .. V3

V0	V1	V2	V3
207.79V	**129.26V**	**100V**	**72.59 V**
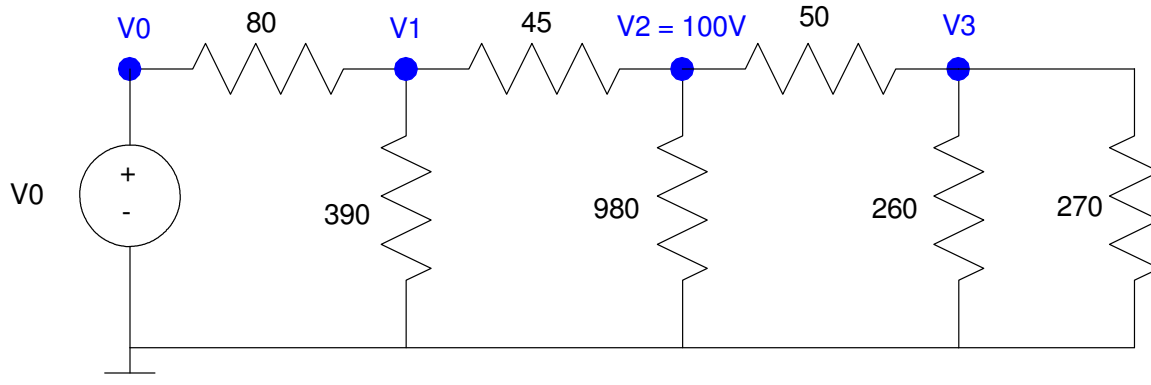
260 || 270 = 132.45 Ohms

$$V_3 = \left(\frac{132.45}{132.45+50} \right) V_2 = 72.59V$$

132.45 + 50 = 182.45 Ohms

182.45 || 980 = 153.82 Ohms

$$V_2 = \left(\frac{153.82}{153.82+45} \right) V_1$$

$$V_1 = 129.26V$$

153.82 + 45 = 198.82 Ohms
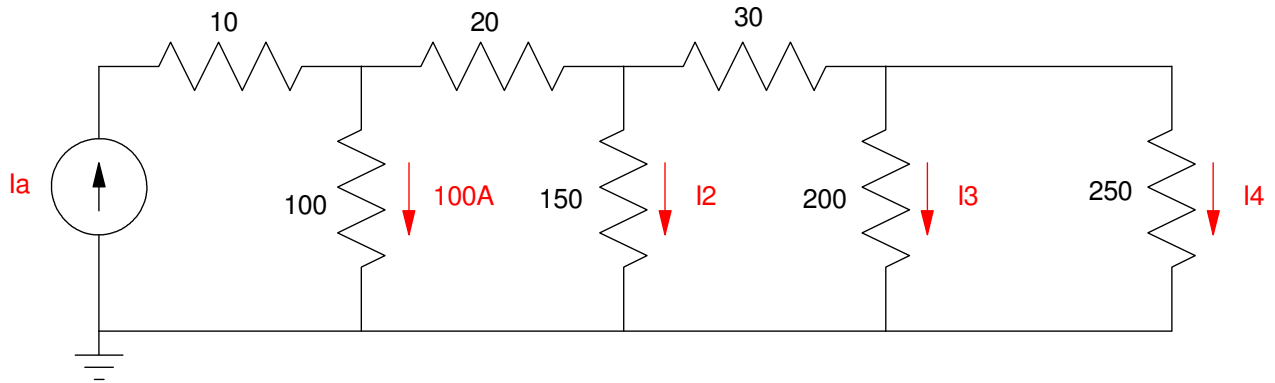
188.82 || 390 = 131.68 Ohms

$$V_1 = \left(\frac{131.68}{131.68+80} \right) V_0$$

$$V_0 = 207.79V$$

4) Current Division. Determine the currents given that I1 = 100A

Ia	I2	I3	I4
207.863A	**52.285A**	**30.877A**	**24.701A**

100A * 100 Ohms = 10,000V

250 || 200 111.11 Ohms

111.11 + 30 = 141.11 Ohms

141.11 || 150 = 72.710 Ohms

72.710 + 20 = 91.710 Ohms

I2 + I3 + I4 = 10,000V / 91.710 Ohms = 107.863A

$$I_2 = \left(\frac{\frac{1}{150}}{\frac{1}{150} + \frac{1}{141.11}} \right) 107.863A = 52.285A$$
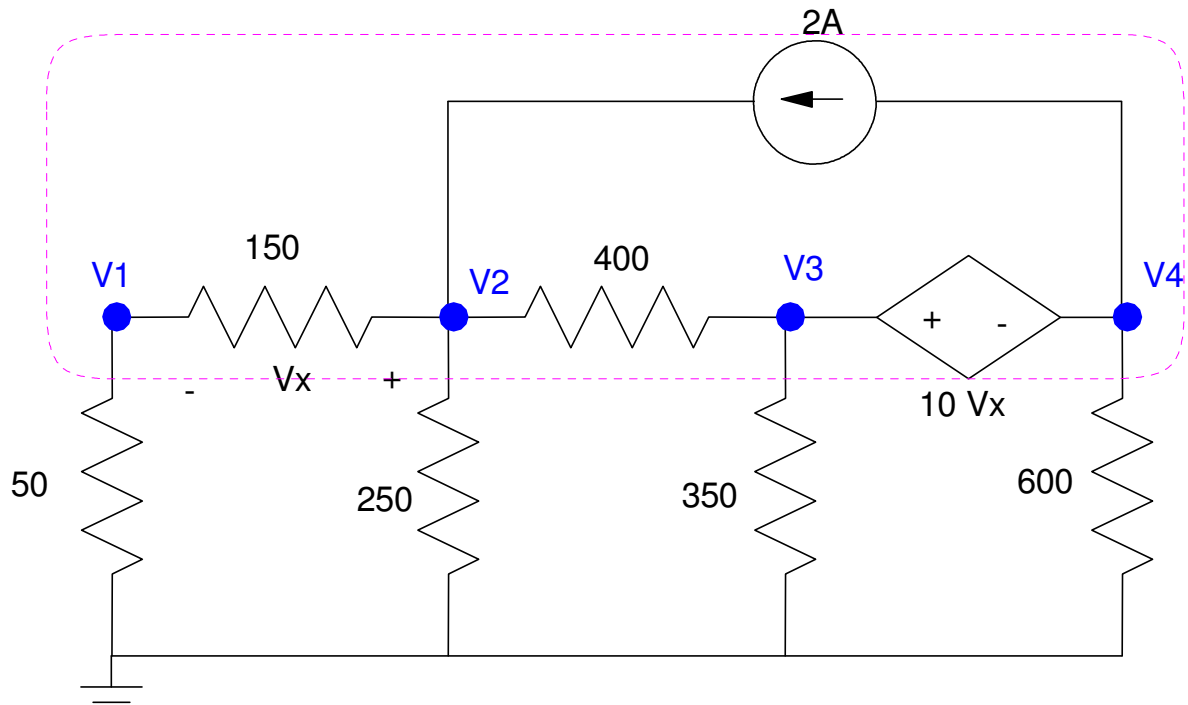
$$I_3 + I_4 = 55.578A$$

$$I_3 = \left(\frac{\frac{1}{200}}{\frac{1}{200} + \frac{1}{250}} \right) 55.578A = 30.877A$$

$$I_4 = 55.578 - I_3 = 24.701A$$

$$I_a = 100 + I_2 + I_3 + I_4 = 207.863A$$

5) Voltage Nodes: Write 5 equations to solve for the 5 unknwns.
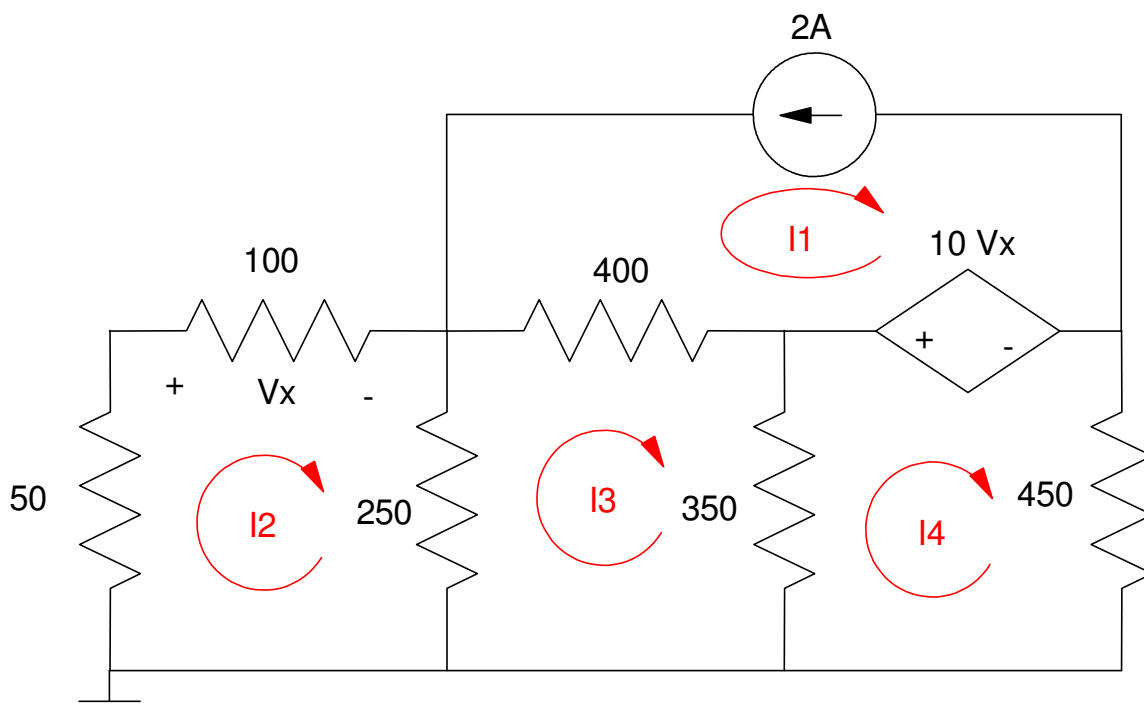

$$V_x = V_2 - V_1$$

$$V_3 - V_4 = 10V_x$$

$$\left(\frac{V_1}{50}\right) + \left(\frac{V_1 - V_2}{150}\right) = ($$

$$\left(\frac{V_2 - V_1}{150}\right) + \left(\frac{V_2}{250}\right) + \left(\frac{V_2 - V_3}{400}\right) - 2 = 0$$

Supernode

$$\left(\frac{V_1}{50}\right) + \left(\frac{V_2}{250}\right) + \left(\frac{V_3}{350}\right) + \left(\frac{V_4}{600}\right) = 0$$

6) Current Loops. Write 5 equations to solve for 5 unknowns

$$I_1 = -2$$

$$V_x = 100I_2$$

$$50I_2 + 100I_2 + 250(I_2 - I_3) = 0$$

$$250(I_3 - I_2) + 400(I_3 - I_1) + 350(I_3 - I_4) = 0$$

$$350(I_4 - I_3) + 10V_x + 450(I_4) = 0$$