

EE 206 Test #1d - Name _____

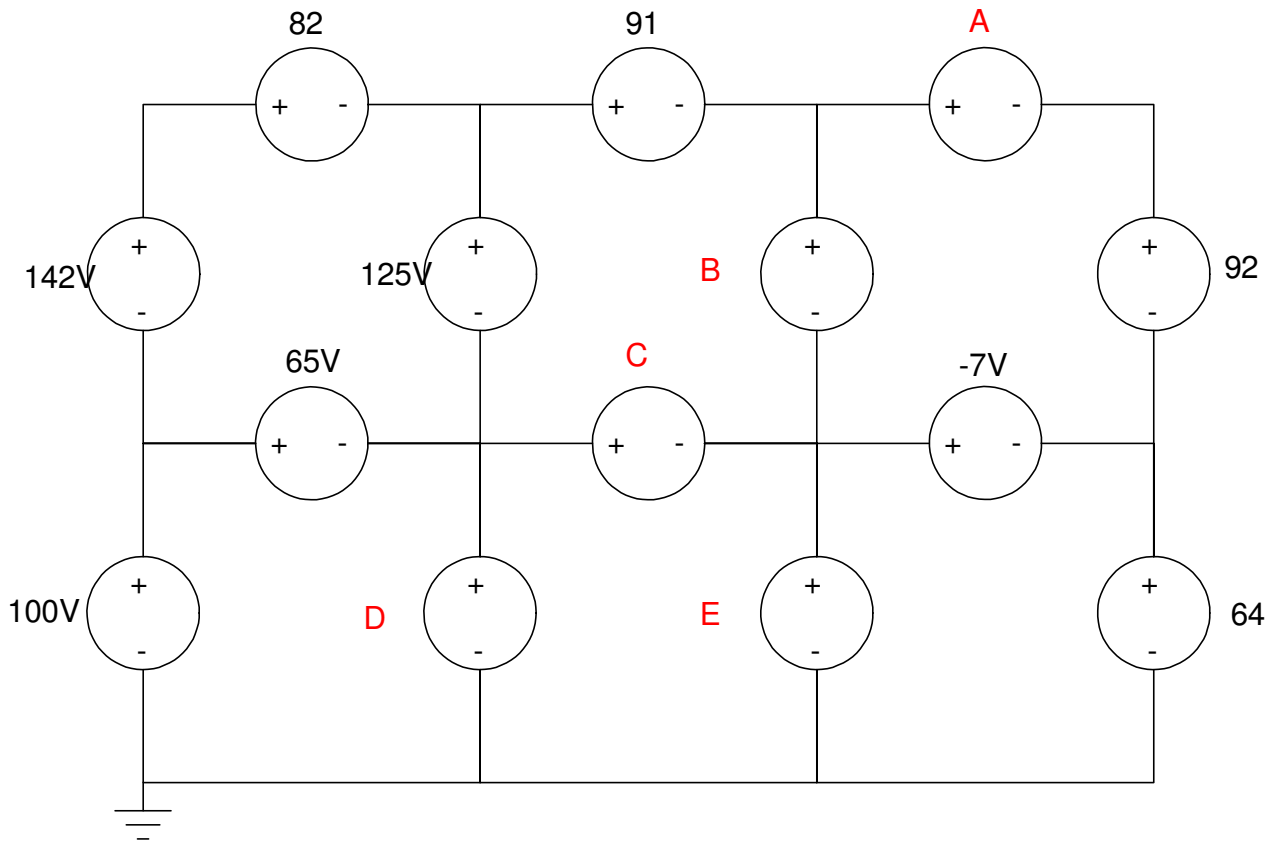
Resistors, Current Loops, Voltages Nodes. Due May 7th at midnight

Open book, open notes, internet, calculators, matlab permitted. Individual effort only.

No aid given, received, or observed: (signature) _____

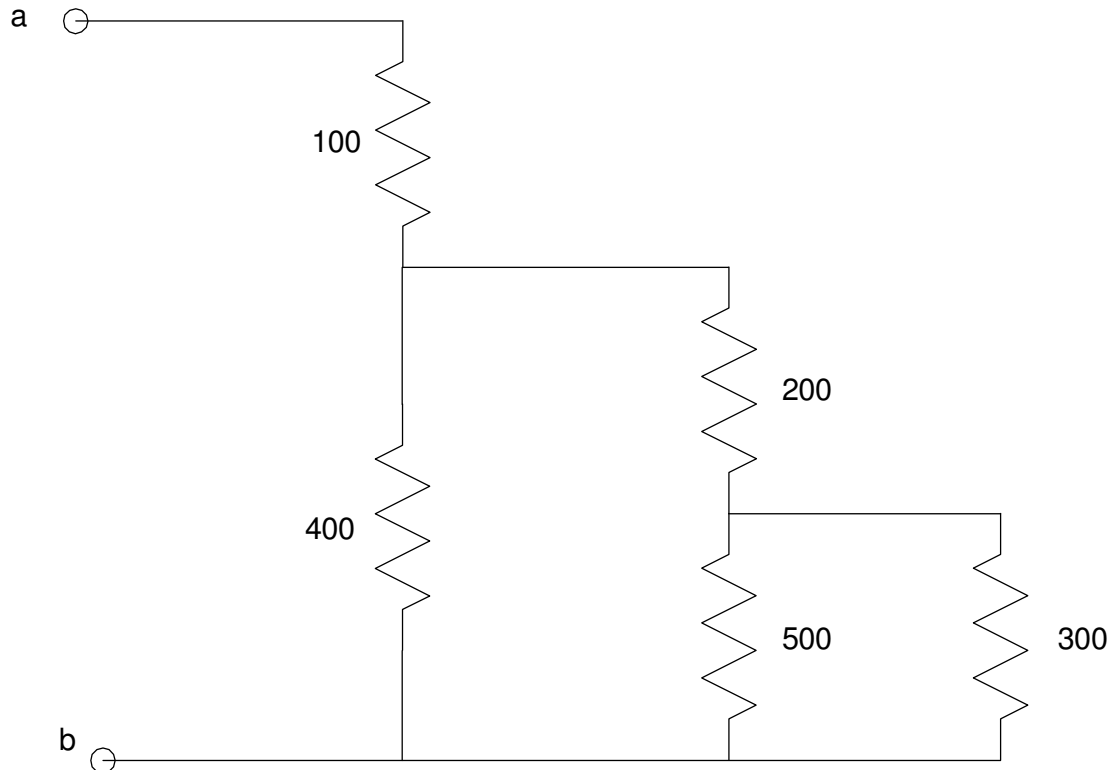
1) Kirchoff's Laws. Determine the unknown voltages (they can be negative)

A	B	C	D	E
-87V	+12V	-22V	+35V	+57V



2) Determine the resistance R_{ab}

296.82 Ohms



$$300 \parallel 500 = 187.5$$

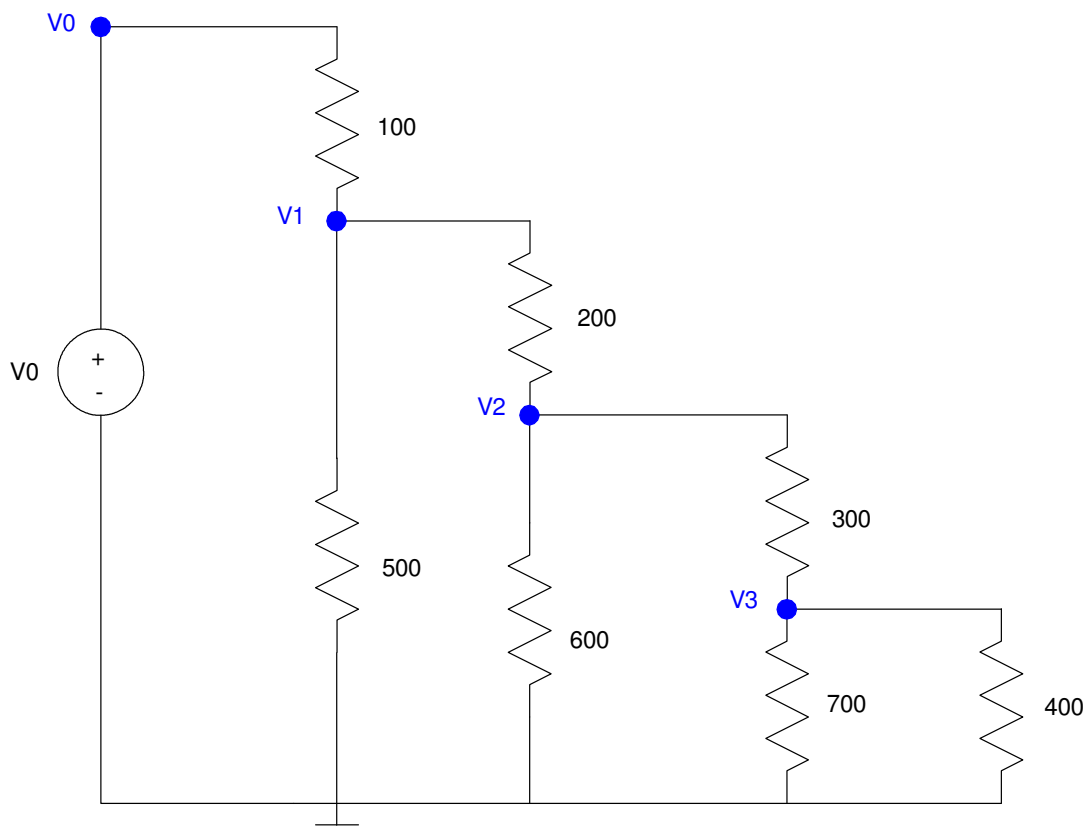
$$187.5 + 200 = 387.5$$

$$387.5 \parallel 400 = 196.8$$

$$196.8 + 100 = 296.8$$

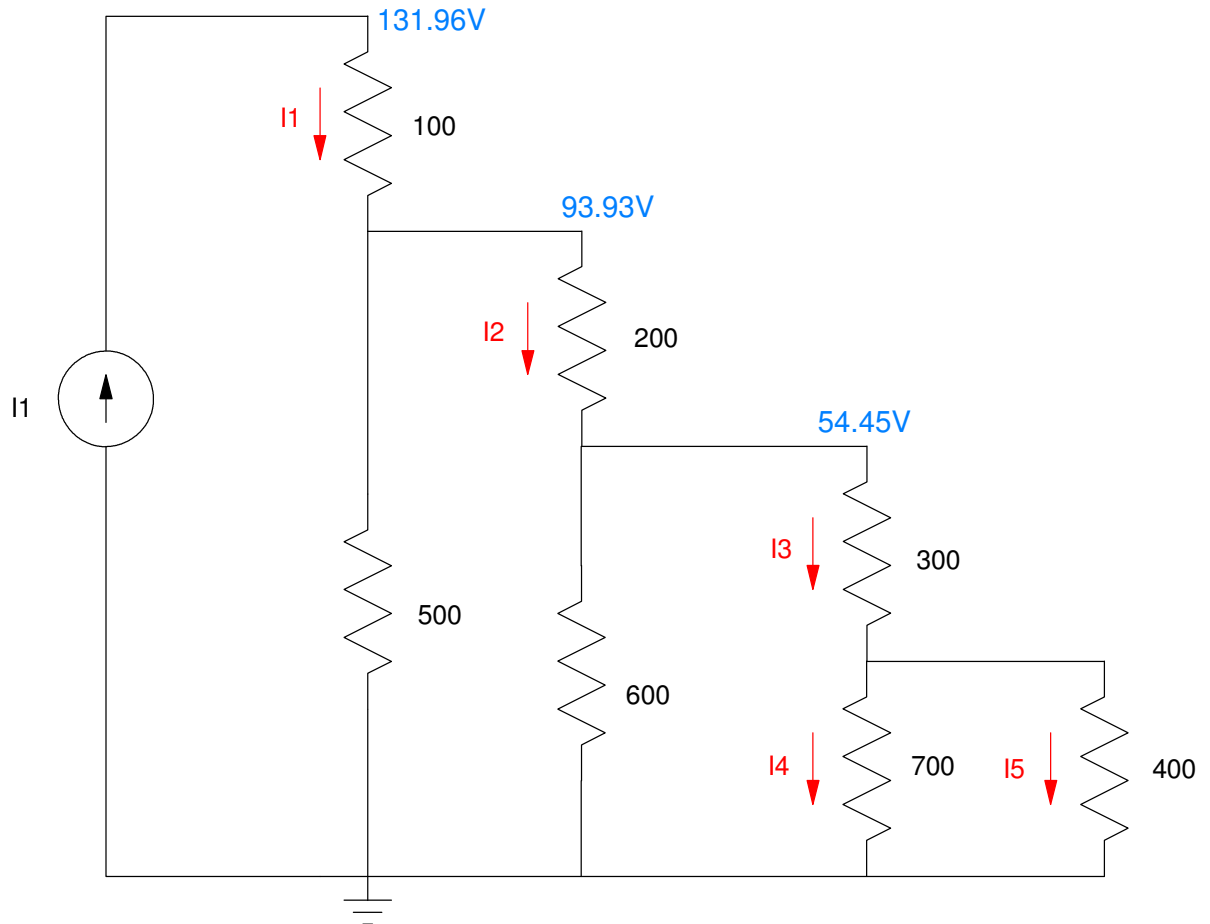
3) Voltage Division. Use voltage division to determine the voltages V_1 .. V_3

V_0	V_1	V_2	V_3
518.43 V	369.03V	217.85 V	100 V

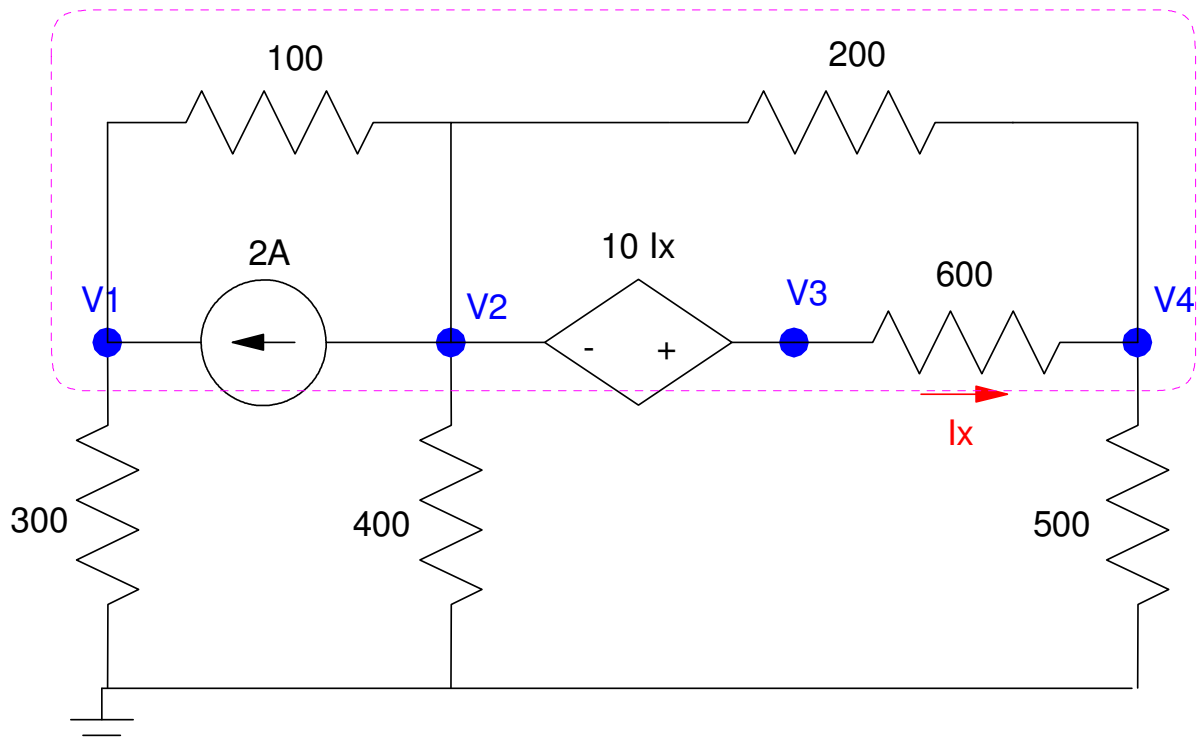


4) Current Division. Determine the currents

I1	I2	I3	I4	I5
380.27 mA	192.4 mA	100 mA	36.36 mA	63.63 mA

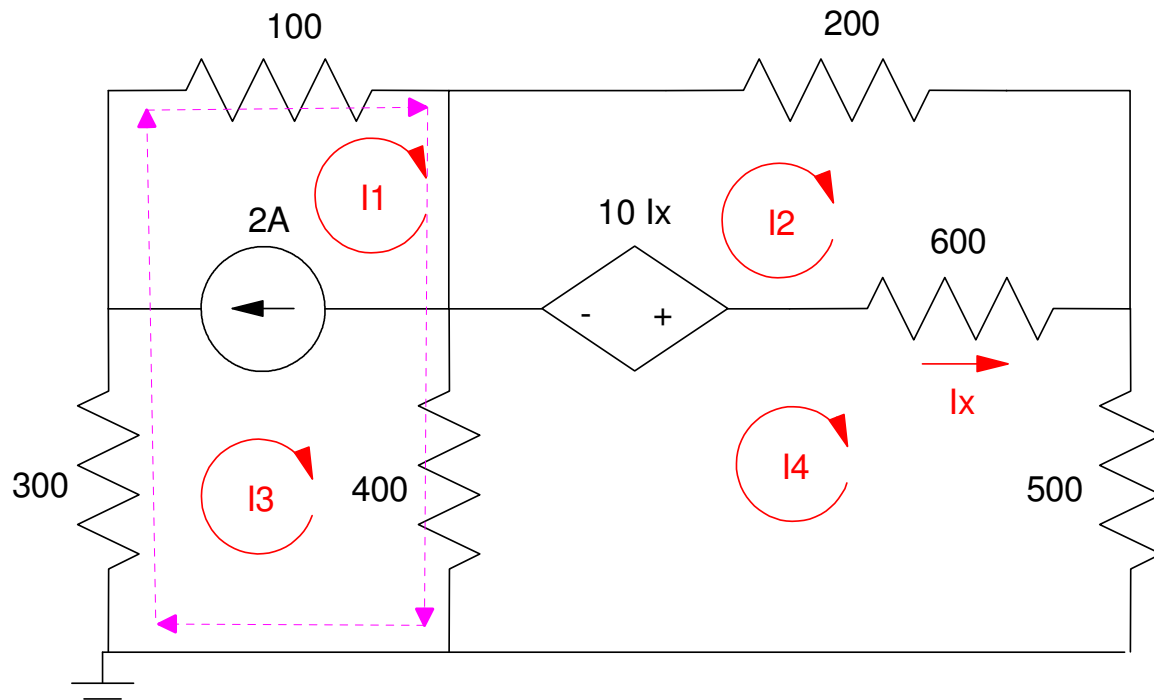


5) Voltage Nodes: Write 5 equations to solve for the 5 unknowns.



- $I_x = \left(\frac{V_3 - V_4}{600} \right)$
- $10I_x = V_3 - V_2$
- $\left(\frac{V_1}{300} \right) + \left(\frac{V_1 - V_2}{100} \right) - 2 = 0$
- $\left(\frac{V_4 - V_2}{200} \right) + \left(\frac{V_4 - V_3}{600} \right) + \left(\frac{V_4}{500} \right) = 0$
- $\left(\frac{V_1}{300} \right) + \left(\frac{V_2}{400} \right) + \left(\frac{V_4}{500} \right) = 0$ *supernode*

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



- $I_x = I_4 - I_2$
- $I_1 - I_3 = 2$
- $400I_4 - 10I_x + 600(I_4 - I_2) + 500I_4 = 0$
- $200I_2 + 600(I_2 - I_4) + 10I_x = 0$
- $300I_3 + 100I_1 + 400(I_3 - I_4) = 0$ *super loop*