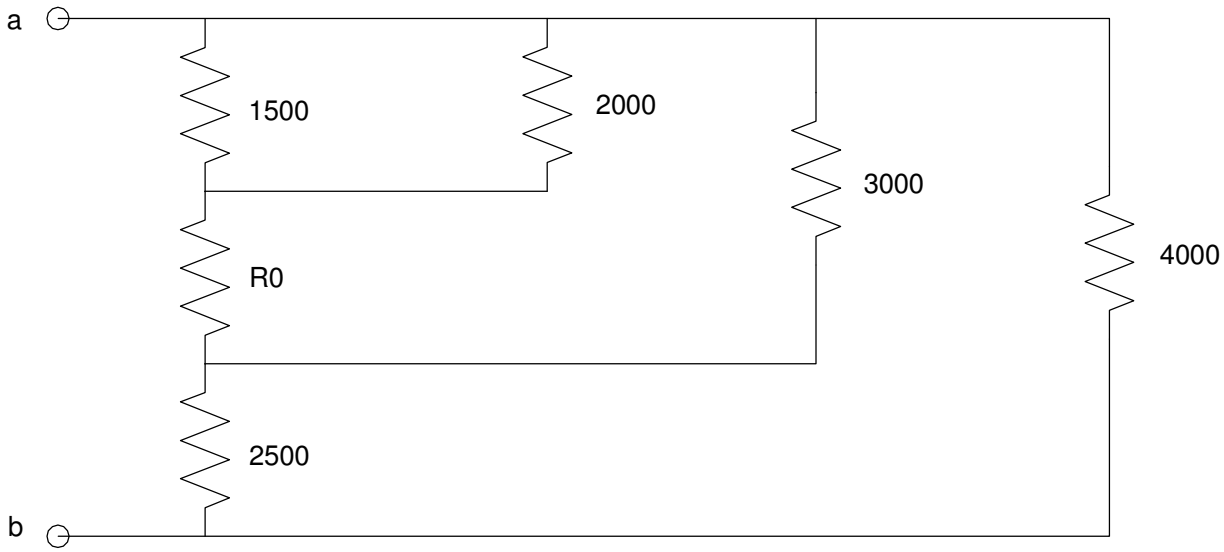
ECE 320 - Quiz #1 - Name _____

EE 206 Review. September 2, 2021

1) Determine the resistance Rab.

- Let R0 be 1000 + 100*(your birth month) + (your birth date).
- For example, May 14th would give R = 1514 Ohms.

R0 1000 + 100*mo + day	Rab
1514 Ohms varies with each student	**1955.11 Ohms**



1500 || 2000 = 857.14

857.1429 + 1514 = 2371.14

2731.14 || 3000 = 1324.38

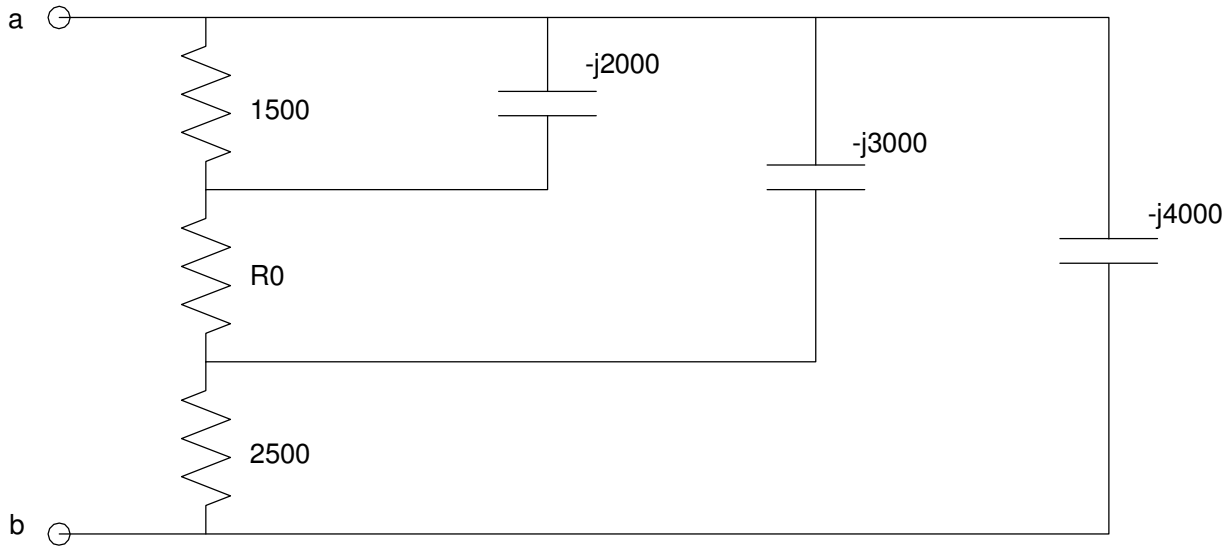
1324.38 + 2500 = 3824.38

3824.38 || 4000 = 1955.11

2) Determine the resistance Rab (note: it will be a complex number)

- Let R be 1000 + 100*(your birth month) + (your birth date).
- For example, May 14th would give R = 1514 Ohms.

R0 `1000 + 100*mo + day`	Rab
1514 Ohms varies with each student	**1397.25 - j1943.08**



(1500) || (-j2000) = 960 - j720

(960 - j720) + (1514) = 2474 - j720

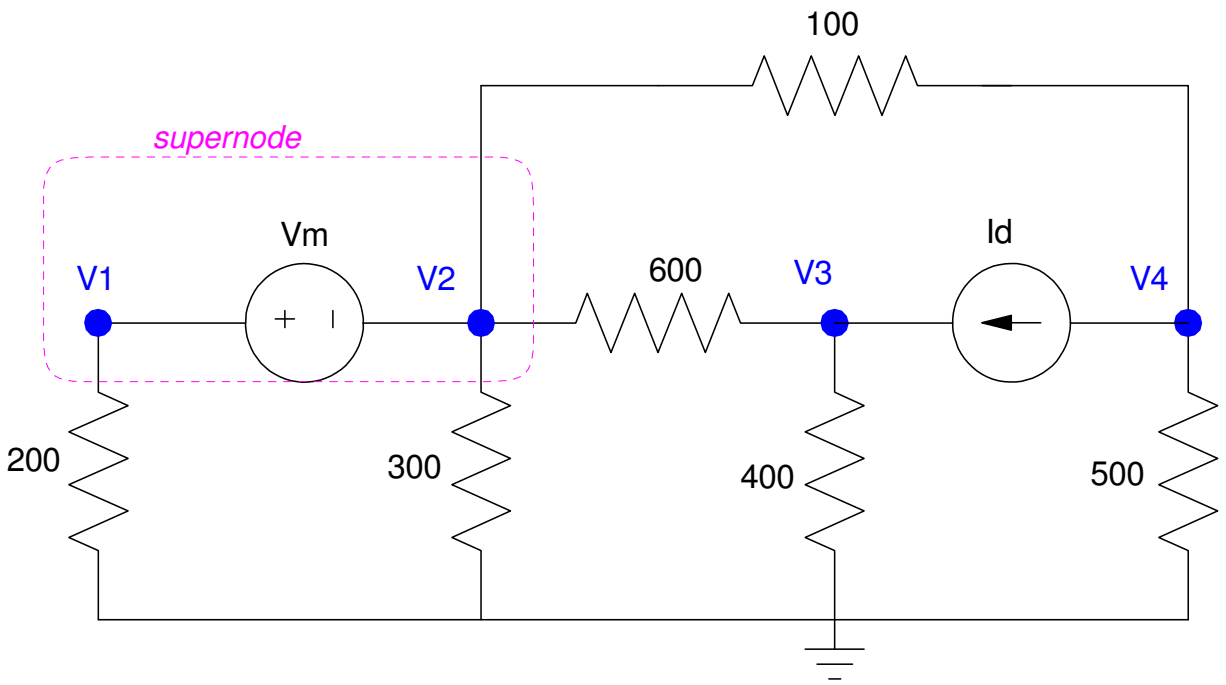
(2474 - j720) || (-j3000) = 1115.58 - j1322.57

(1115.58 - j1322.57) + (2500) = 3615.58 - j1322.57

(3615.58 - j1322.57) || (-j4000) = 1397.25 - j1943.08

3) Votlage Nodes: Write the voltage node equations for the following circuit. Assume

- Vm is your birth month (1..12)
- Id is your birth date (1..31 mA)

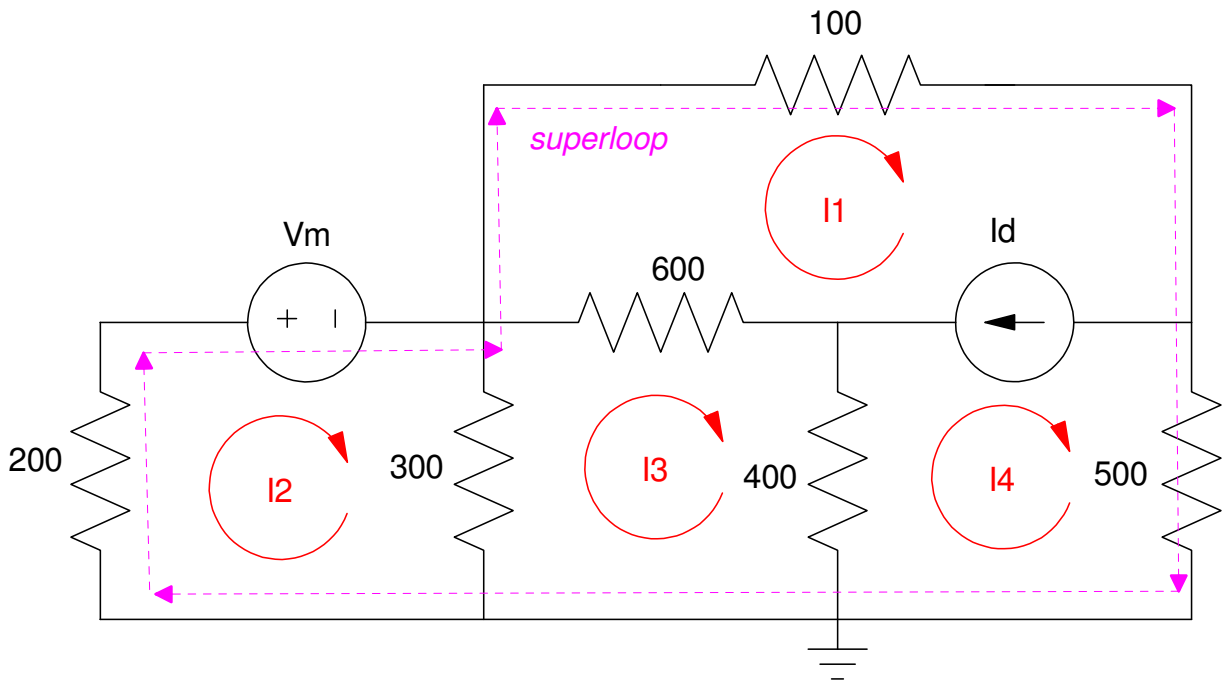


Vm = 5V (birth month: 1..12)	Id = 14mA (birth date: 1..31) mA

- $V_1 - V_2 = 5V$
- $\left(\frac{V_3 - V_2}{600}\right) + \left(\frac{V_3}{400}\right) - 14mA = 0$
- $\left(\frac{V_4 - V_2}{100}\right) + 14mA + \left(\frac{V_4}{500}\right) = 0$
- $\left(\frac{V_1}{200}\right) + \left(\frac{V_2}{300}\right) + \left(\frac{V_2 - V_3}{600}\right) + \left(\frac{V_2 - V_4}{100}\right) = 0$

4) Current Loops: Write the current loop equations for the following circuit. Assume

- Vm is your birth month (1..12)
- Id is your birth date (1..31 mA)

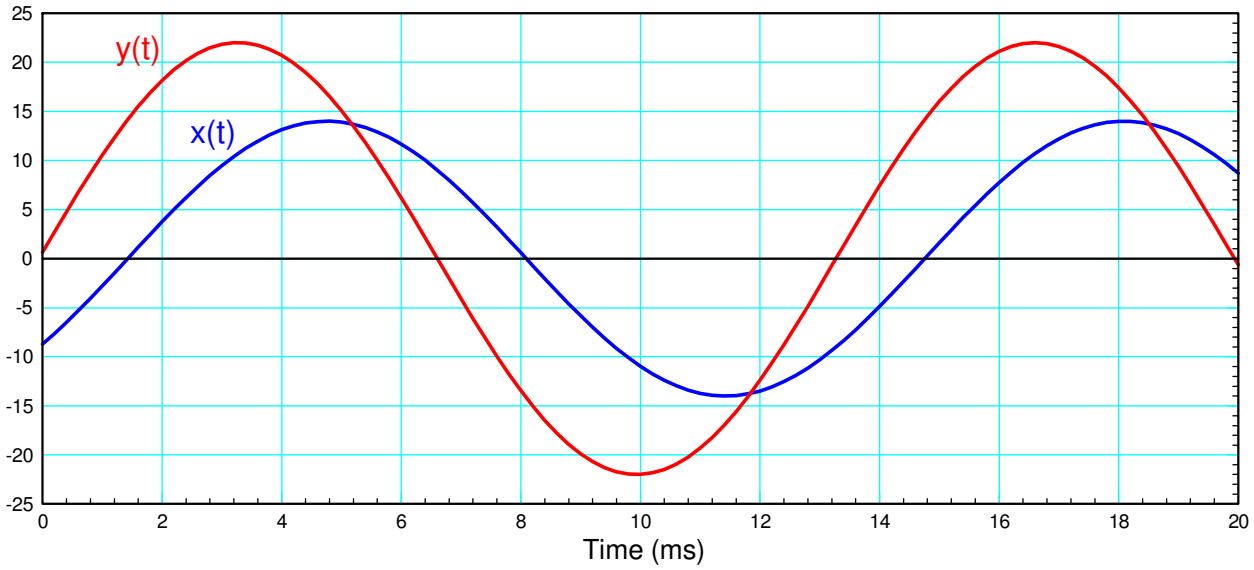


Vm = 5V (birth month: 1..12)	Id = 14mA (birth date: 1..31) mA

- $I_1 - I_4 = 14mA$
- $200I_2 + 5 + 300(I_2 - I_3) = 0$
- $300(I_3 - I_2) + 600(I_3 - I_1) + 400(I_3 - I_4) = 0$
- $200I_2 + 5 + 100I_1 + 500I_4 = 0$

5) Signals X and Y are displayed on an oscilloscope. Give the phasor representation for these two voltages

Frequency (Hz)	X		Y	
	Amplitude	Phase	Amplitude	Phase
75.76 Hz	**14V**	**-125.45 deg** -2.19 radians	**22V**	**-92.73 deg** -1.62 radians



Period = 13.2ms

$$f = \frac{1}{period} = \frac{1}{13.2ms} = 75.76Hz$$

X:

peak = 14V

delay to peak = 4.6ms (approx)

$$\theta_x = -\left(\frac{4.6ms}{13.2ms}\right)360^0 = -125.45^0 = -2.19rad$$

Y:

peak = 22V

delay of peak = 3.4ms (approx)

$$\theta_y = -\left(\frac{3.4ms}{13.2ms}\right)360^0 = -92.73^0 = -1.62rad$$

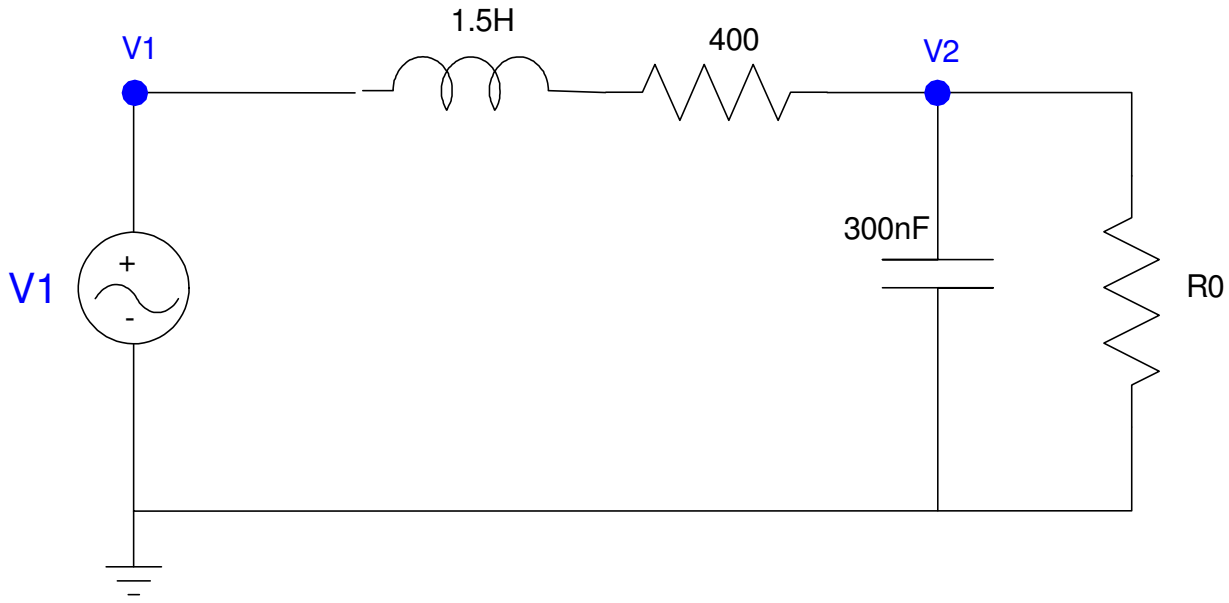
6) Assume R0 is 1000 + 100*(your birth month) + (your birth date).

- For example, May 14th would give R0 = 1514 Ohms

Determine V2(t) assuming

$$V_1(t) = 10 + 8\sin(250t)$$

R0 1000 + 100*(mo) + (day)	V2(t)
1514	**7.91 - 1.38 cos(250t) + 6.16 sin(250t)**



DC (blue)

V1 = 10

L = 0

C = infinity

$$V_2 = \left(\frac{1514}{1514+400}\right)10 = 7.91V$$

AC (red)

V1 = 0 - j8

L = j375 Ohms

C = -j13,333 Ohms

R0 ‖ C = 1494.73 - j169.73

$$V_2 = \left(\frac{(1494.73-j169.73)}{(1494.73-j169.73)+(400+j375)}\right)(0-j8)$$

$$V_2 = -1.38 - j6.16$$

V2(t) = -1.38 cos(250t) + 6.16 sin(250t)