

ECE 320 - Quiz #1 - Name _____

EE 206 Review. January 21, 2021

Open book, open notes. Calculators permitted. Individual Effort.

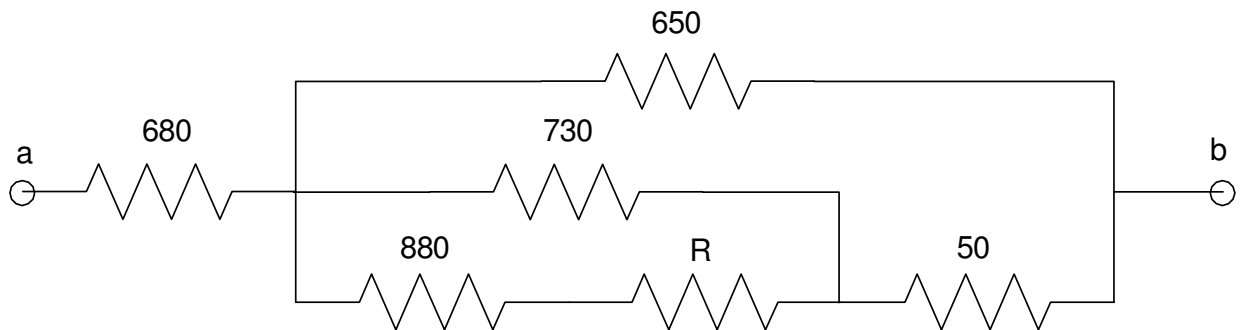
1) Let R be your birthday

$$R = 1000 + (\text{month}) * 100 + (\text{day})$$

For example, May 14th would give $R = 1514$ Ohms

Determine the resistance R_{ab}

R $1000 + 100 * \text{month} + \text{day}$	R_{ab}
1514 varies with each test	994.527 depends upon R



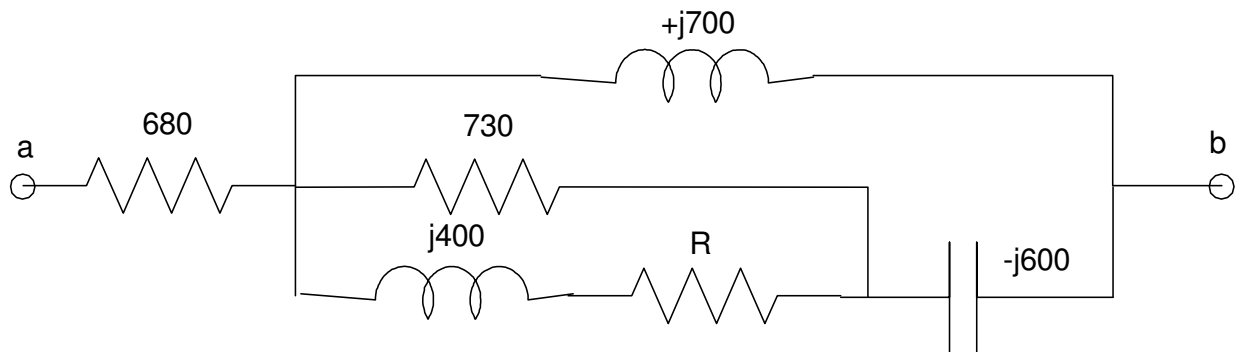
2) Let R be your birthday

$$R = 1000 + (\text{month}) * 100 + (\text{day})$$

For example, May 14th would give $R = 1514$ Ohms

Determine the resistance Z_{ab} (it will be a complex number)

R $1000 + 100 * \text{month} + \text{day}$	Z_{ab}
1514 varies with each quiz	$1588.04 + j443.80$ depends upon R

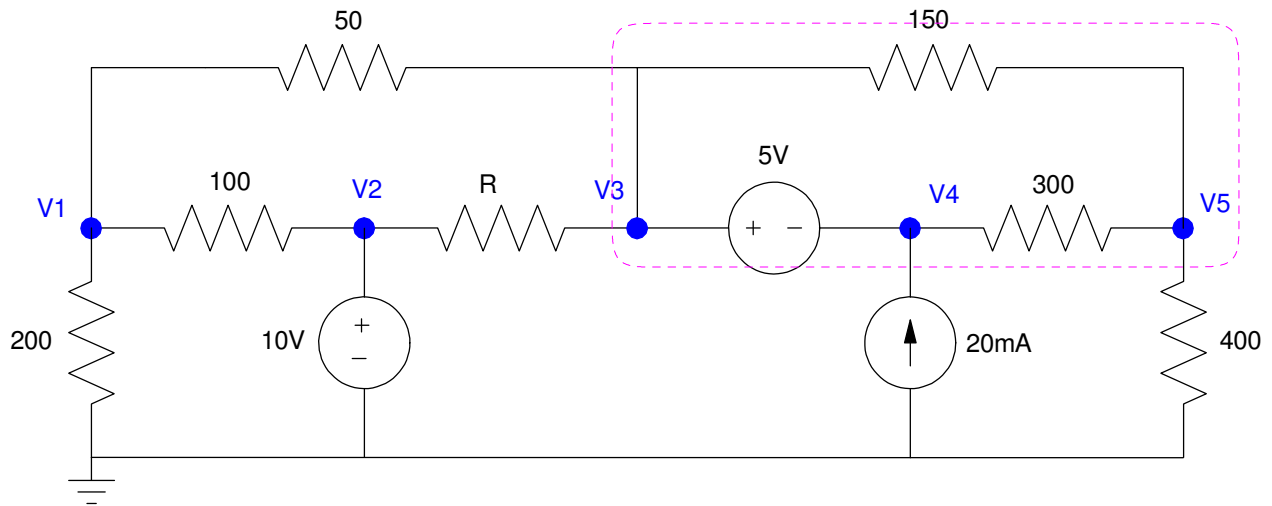


3) Voltage Nodes. Let R be your birthday

$$R = 1000 + (\text{month}) * 100 + (\text{day})$$

For example, May 14th would give $R = 1514$ Ohms

Give 5 equations to solve for the 5 unknown voltages. (you don't need to solve)



$$R = 1514$$

$$V_2 = 10$$

$$V_3 - V_4 = 5$$

$$\left(\frac{V_1}{200} \right) + \left(\frac{V_1 - V_2}{100} \right) + \left(\frac{V_1 - V_3}{50} \right) = 0$$

$$\left(\frac{V_5}{400} \right) + \left(\frac{V_5 - V_4}{300} \right) + \left(\frac{V_5 - V_3}{150} \right) = 0$$

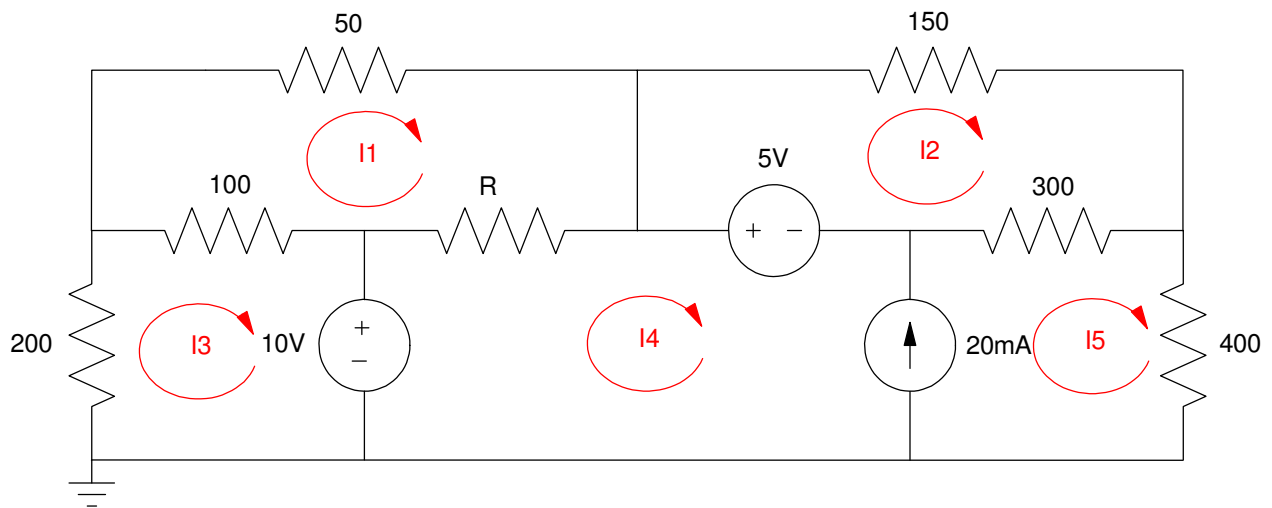
$$\left(\frac{V_3 - V_2}{R} \right) + \left(\frac{V_3 - V_1}{50} \right) - 20mA + \left(\frac{V_5}{400} \right) = 0$$

4) Current Loops. Let R be your birthday

$$R = 1000 + (\text{month}) * 100 + (\text{day})$$

For example, May 14th would give $R = 1514$ Ohms

Give 5 equations to solve for the 5 unknown currents



$$R = 1514$$

$$I_5 - I_4 = 20mA$$

$$50I_1 + R(I_1 - I_4) + 100(I_1 - I_3) = 0$$

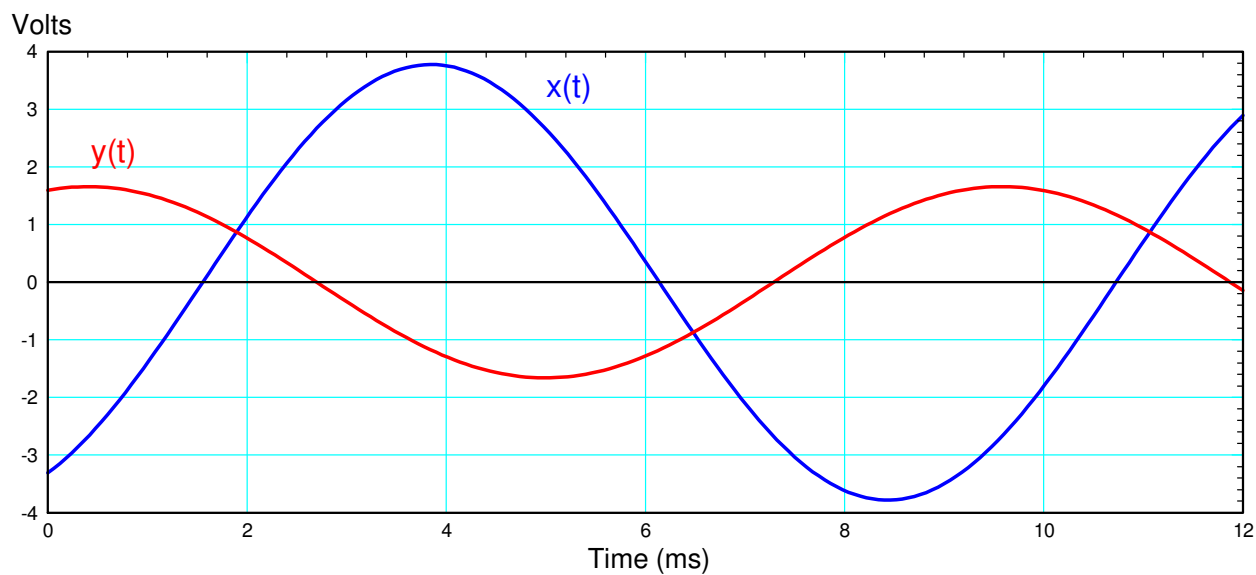
$$150I_2 + 300(I_2 - I_5) - 5 = 0$$

$$200I_3 + 100(I_3 - I_1) + 10 = 0$$

$$200I_3 + 50I_1 + 150I_2 + 400I_5 = 0$$

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
111 Hz	3.8V	-156 deg	1.7V	-20 deg



Period = 9ms

frequency = $1 / \text{period} = 111\text{Hz}$

$$\theta_x = -\left(\frac{3.9\text{ms delay to peak}}{9\text{ms period}}\right) 360^\circ = -156^\circ$$

$$\theta_y = -\left(\frac{0.5\text{ms delay to peak}}{9\text{ms period}}\right) 360^\circ = -20^\circ$$

6) Let R be your birthday

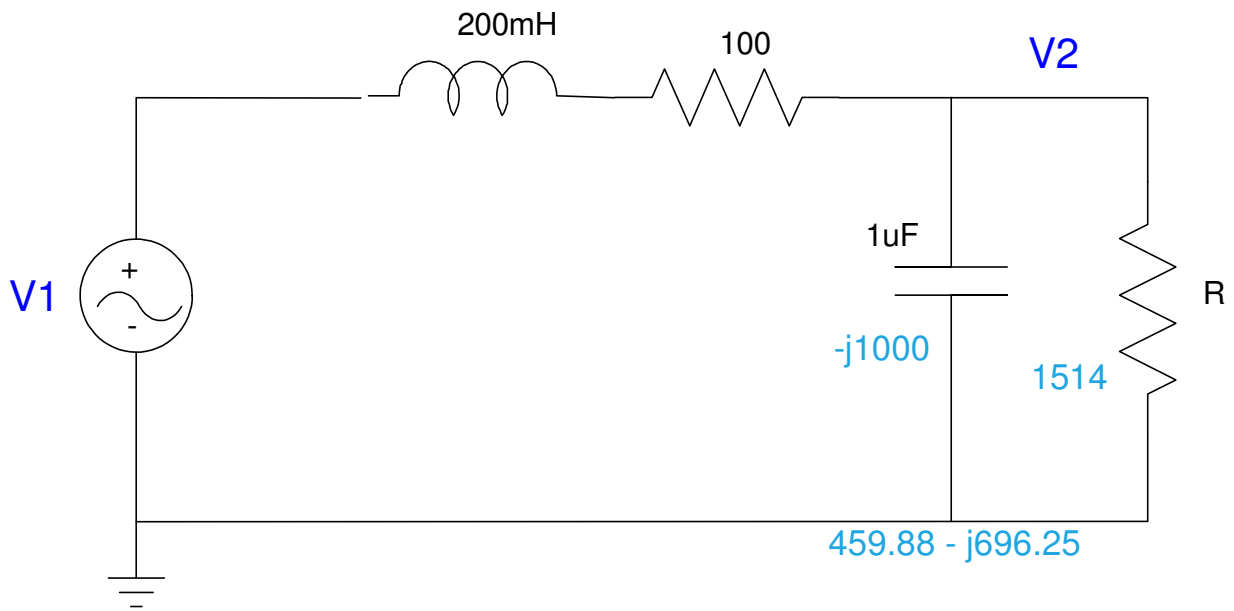
$$R = 1000 + (\text{month}) * 100 + (\text{day})$$

For example, May 14th would give $R = 1514$ Ohms

Determine $V_2(t)$ assuming

$$V_1(t) = 12 + 5 \cos(1000t) + 2 \sin(1000t)$$

$R =$	1514 Ohms
$V_2(t) =$	$11.26 + 4.81 \cos(1000t) + 3.60 \sin(1000t)$



DC:

$$V_2 = \left(\frac{1514}{1514 + 100} \right) 12V = 11.26V$$

AC:

$$L \rightarrow j\omega L = j200$$

$$C \rightarrow \frac{1}{j\omega C} = -j1000$$

$$R || C = 459.88 - j696.25$$

$$V_2 = \left(\frac{(459.88 - j696.25)}{(459.88 - j696.25) + (100 + j200)} \right) (5 - j2)$$

$$V_2 = 4.81 - j3.60$$

