ECE 35, Winter 2022

Quiz 4

/ 12

Your sequence number	
Last name	
First + middle name(s)	
PID	

Instructions:

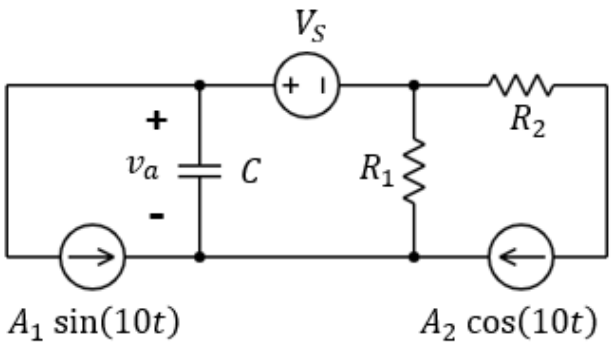
- Read each problem completely and thoroughly before beginning
- All calculations need to be done on these sheets
- Put a box around your answer for each question. Make sure you list units!
- Answers without supporting calculations will receive zero credit

(1) *(6 points)*

Consider the circuit below. You may assume it is in steady state.

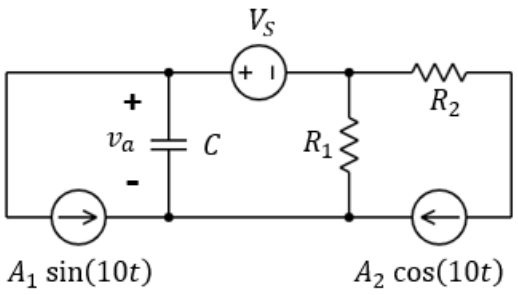
a. Find the voltage v_a at time $t = \frac{\pi}{40}$.

b. Find a time t_0 where the voltage v_a reaches its maximum value. If there are multiple possible answers, giving only one is sufficient.



A1:	2 A
A2:	2 A
Vs:	1 V
R1:	2 Ω
R2:	2 Ω
C:	50 mF

The circuit is also copied on the next page for your convenience.



A1:	2 A
A2:	2 A
Vs:	1 V
R1:	2 Ω
R2:	2 Ω
C:	50 mF

(2) *(6 points)*

Consider the circuit below. You may assume it has reached steady state. The phasor diagram shows the phasors of i_1 and i_2 (the angles are as shown; the magnitudes are not drawn to scale).

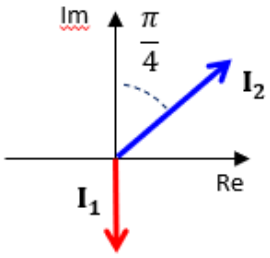
Each rectangular box represents a connection of mystery elements in series/parallel. The impedances of the two boxes are $\boldsymbol{Z_a = aj}$ and $\boldsymbol{Z_b = b(1+j)}$ but you are not told which one is which.

Note: you are given the values for a, b and $|V|$.

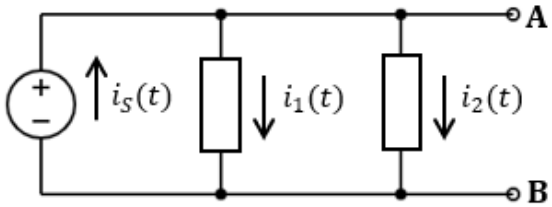
(a) We want to build the impedance Z_b using two elements in series. What elements would you use and what are their values?

(b) Consider the source $v_S(t)$. Find the value of X.

(c) Between A and B, we add a third impedance Z_3, such that the current $i_S(t)$ through the voltage source becomes equal to $i_1(t)$. What is the value of this impedance Z_3?



$v_S(t) = |V| \cdot \cos(10t + X)$



a:	-2
b:	3
$\|V\|$:	2 V