ECE 209 — Final Exam

Estimated time for completion: <75 minutes
12 December 2017

Rules of the Exam

Rule 1: The examination period begins at 9:30 am on Tuesday 12 December 2017 and ends at 11:30 am on Tuesday 12 December 2017.

Rule 2: There are three problems; each problem has equal weight.

Rule 3: Show all work and state all assumptions. Make sure to include the units along with a numerical answer. Answers without support when needed will not receive credit.

Rule 4: Do not leave the room until you have completed the exam.

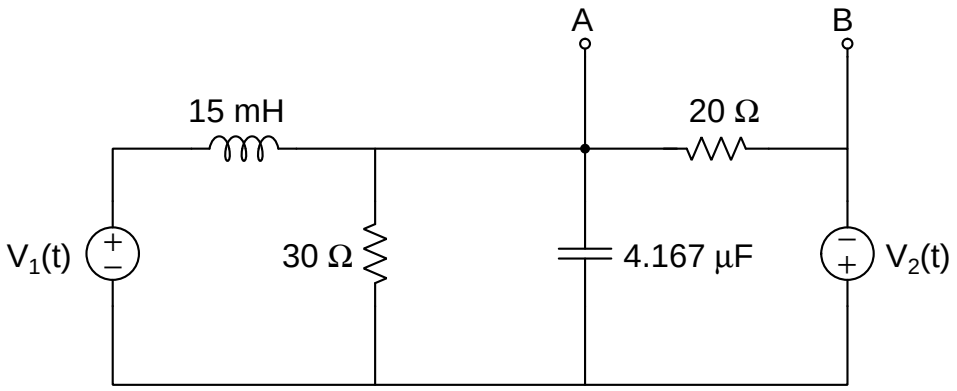
Rule 5: The exam is closed book and closed notes. You may have an 8.5" x 11" sheet of paper with notes. You may use a calculator.

_____

Name

Problem 1

In the circuit below, $V_1(t) = 240\cos(4000t + 53.13°)$ V and $V_2(t) = 96\sin(4000t)$ V.



Part A: Draw the Phasor (frequency domain) representation of the circuit.

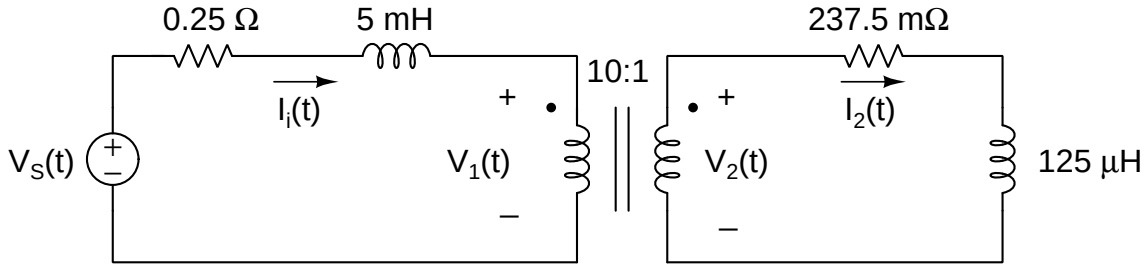
Part B: Draw the Thévenin Equivalent Circuit with respect to terminals A and B.

Part C: If a load impedance Z_L is placed between terminals A and B:
What value of Z_L produces the maximum power transfer to the load? _____

What is the power dissipated by this value of Z_L? _____

Problem 2

In the circuit below, the transformer is ideal and $V_s(t) = 2500\cos(400t)$ V.



What is $V_1(t)$? _____

What is $V_2(t)$? _____

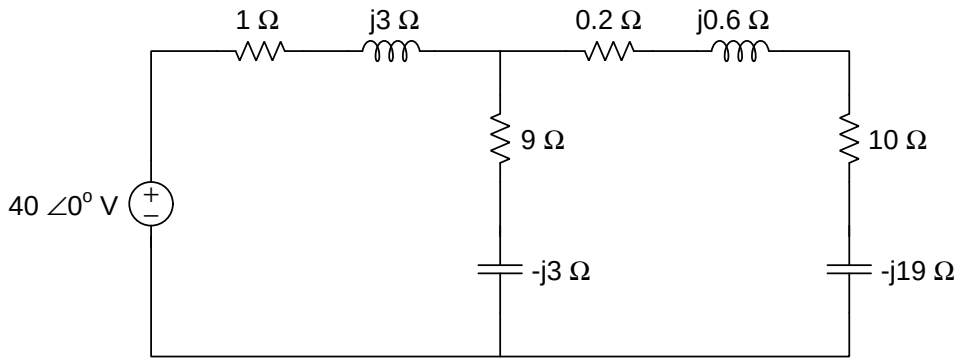
What is $I_1(t)$? _____

What is $I_2(t)$? _____

What is the frequency of $V_2(t)$ in Hertz? _____

Problem 3

Consider the circuit below:



What is the real power associated with the voltage source? _____

What is the reactive power associated with the voltage source? _____

What is the apparent power associated with the voltage source? _____

Does the voltage source absorb or deliver power? _____

What is the average power power associated with the 10Ω resistor? _____

What is the reactive power associated with the 10Ω resistor? _____

Name: _____

Name: _____