ECE 209 — Final Exam

Estimated time for completion: <75 minutes
13 December 2016

Rules of the Exam

Rule 1: The examination period begins at 12:15pm on Tuesday 13 Decemberr 2016 and ends at 2:15pm on Tuesday 13 December 2016.

Rule 2: There are three problems plus an additional bonus problem.

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.

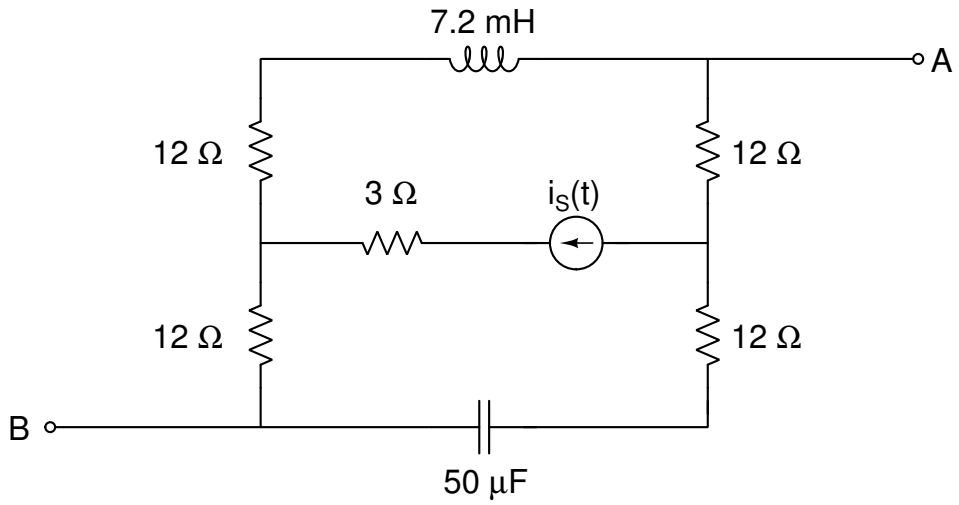
Rule 4: The exam is closed book and closed notes. You may have an 8.5" x 11" sheet of paper with notes. You may use a calculator.

_____

Name

Problem 1 (30 points)

In the circuit below $i_s(t) = 5\cos(1667t)$.



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

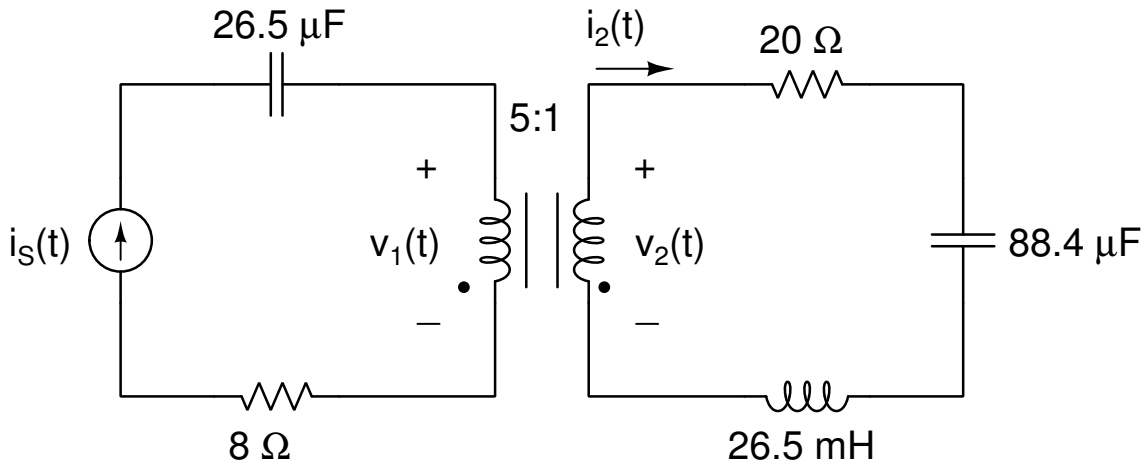
Part B: Draw the Thévenin Equivalent Circuit with respect to terminals A and B.

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 (40 points)

In the circuit below, the transformer is ideal and $i_s(t) = 20\cos(377t)$ mA.



What is $v_1(t)$? _____

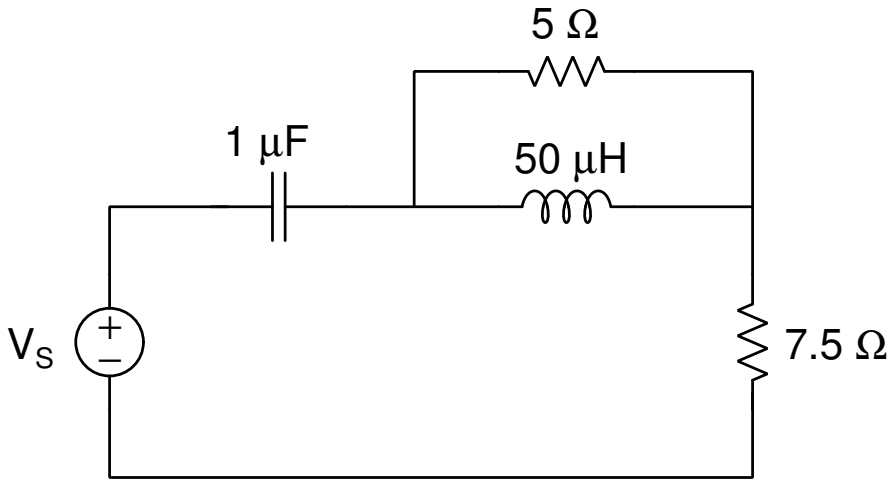
What is $v_2(t)$? _____

What is $i_2(t)$? _____

Whatis the frequency of $i_2(t)$ in Hertz? _____

Problem 3 (30 points)

For the circuit below the voltage source $v_s(t) = 50\cos(10^5 t)$ V



What is the average 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? _____

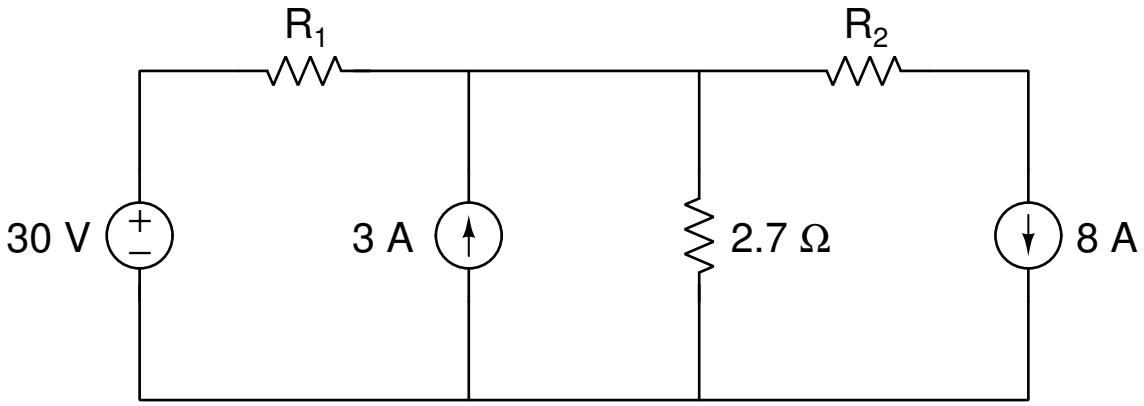
Does the voltage source absorb or deliver power? _____

What is the average power power associated with the 5Ω resistor? _____

What is the reactive power associated with the 5Ω resistor? _____

Bonus Problem (20 points) (All, half or nothing)

In the circuit below, the 3A current source absorbs no power and delivers no power. The total power dissipated in the circuit is 278 W.



What is the value of R_1? _____

What is the value of R_2? _____

Name: _____

Name: _____