ECE 2100 Circuit Analysis
Spring 2015
Final Exam

NAME: _____

INSTRUCTIONS:

1. **THIS EXAM IS CLOSED BOOK AND CLOSED NOTES** ~~other than one-side of a 3"x5" index card. Write your name on the unused side of the card.~~ [4 April 2016]
2. **NO ELECTRONIC DEVICES ARE ALLOWED**.
3. Work each problem in the provided space.
4. Show ALL work required to arrive at a solution for either full or partial credit.
5. READ the entire question before answering.
6. CIRCLE YOUR ANSWERS.
7. Have your student ID on your desktop for inspection by the instructor.
8. SIGN the honesty pledge at the bottom of the page. Exams without a signature will receive no credit.

I have neither given nor received assistance from anyone in regards to completion of this exam. I have followed the instructions as provided on this sheet.

SIGNATURE: _____ DATE: _____

Note: some problems might be adapted from the course text or other sources.
Schematics prepared using LTspice IV (linear.com).

Maximum exam score is 35 points.

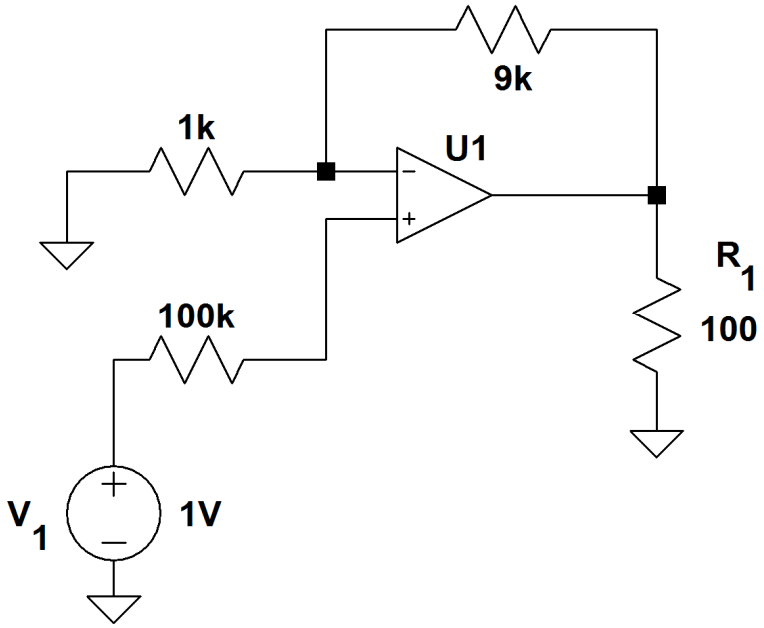
1. (2 points) What is the **complete** formulation (mathematical definition) of complex power?

2. (2 points) What is the ideal input resistance of an ammeter? Justify your response.

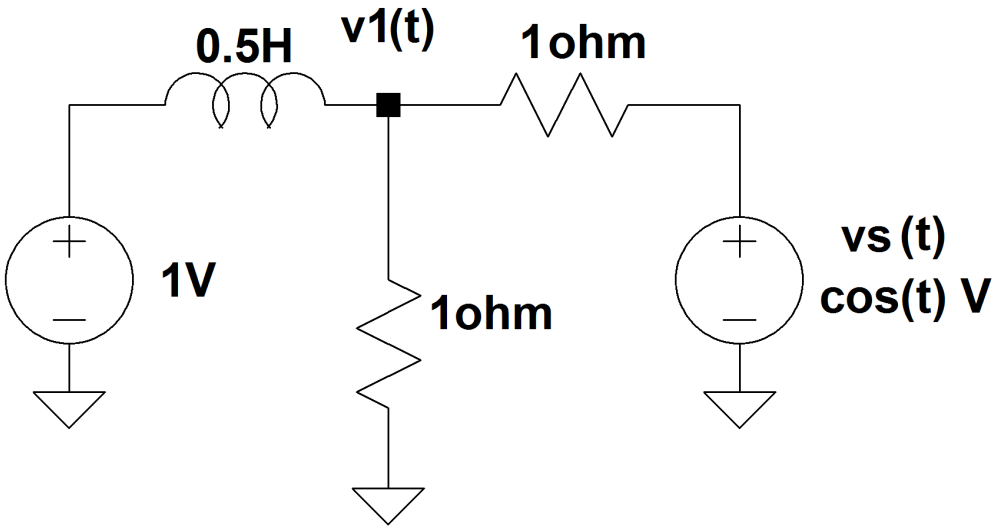
3. (1 point) What is the average real power of a capacitor in the sinusoidal steady state?

4. (5 points) A meter movement has a series resistance of 100Ω and a full scale current of 1mA. Use this meter movement to design a 10V full scale voltmeter. Be sure to show a schematic of your design.

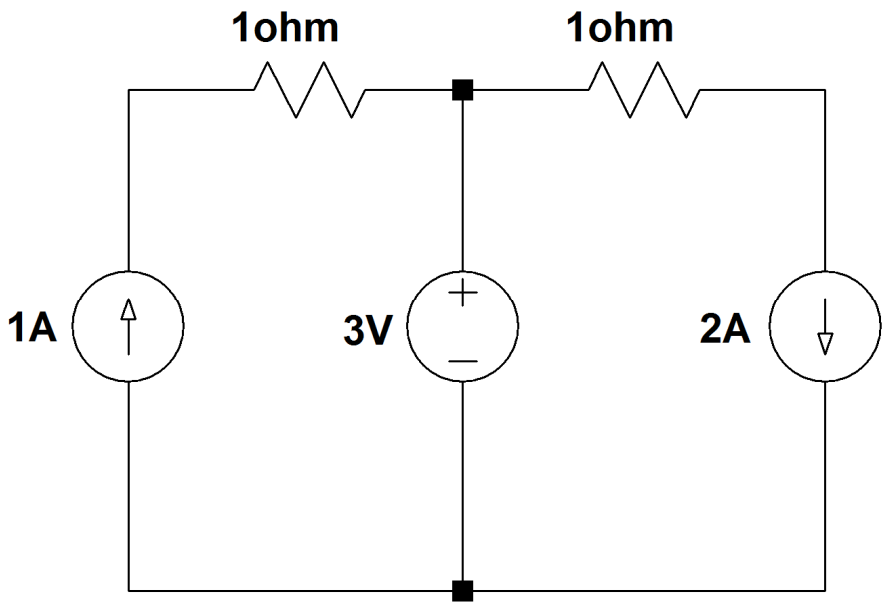
5. (5 points) Find the power of V_1 **and** R_1 assuming an ideal op-amp.



6. (5 points) Find voltage v1(t) in the sinusoidal steady state using the principle of superposition.



7. (5 points) Find the power of each circuit element.



8. (5 points) The complex power of a load is 1+j VA. If the load frequency is 1 rad/s and the voltage across the load is 100V RMS, find the value of a component to be placed in parallel with the load to obtain a unity power factor.

9. (5 points) Assume that there is no energy in the inductor for t<0. Find the voltage v(t) for t>0.