

**ECE 2100 Circuit Analysis**  
**Spring 2015**  
**Exam #2**

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). © 2015 Damon A. Miller

Maximum exam score is 30 points.

1. (2 points) Show how to build an impedance  $-10j$  ohms at  $\omega=100$  rad/s.

2. (2 points) It is your first day on the job as an engineer. An intern working for you computed the power of an electric load connected to a sinusoidal source:

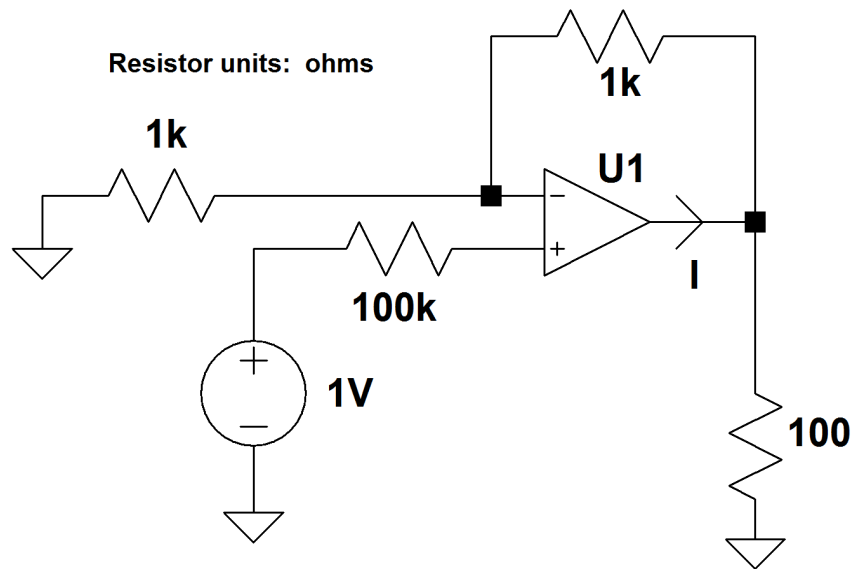
$$P = V_{\text{rms}} \times I_{\text{rms}} = 120V_{\text{rms}} \times 10A_{\text{rms}} = 1200W$$

Do you trust the intern's knowledge of circuit analysis? Why or why not?

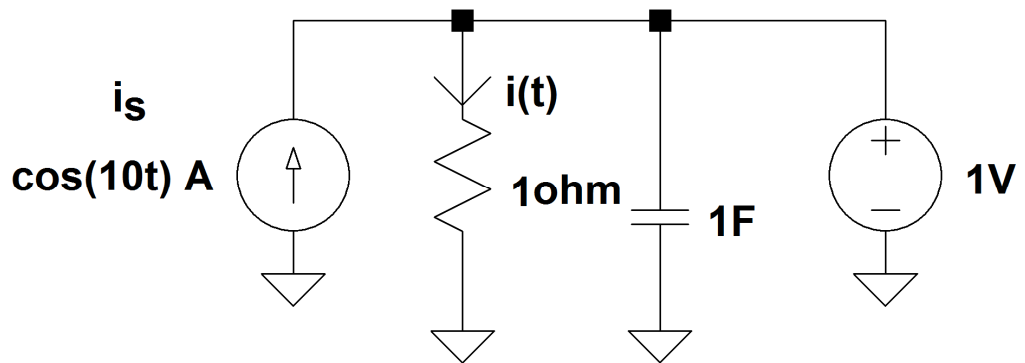
3. (1 point) What is the average real power of an inductor in the sinusoidal steady state?

4. (5 points)

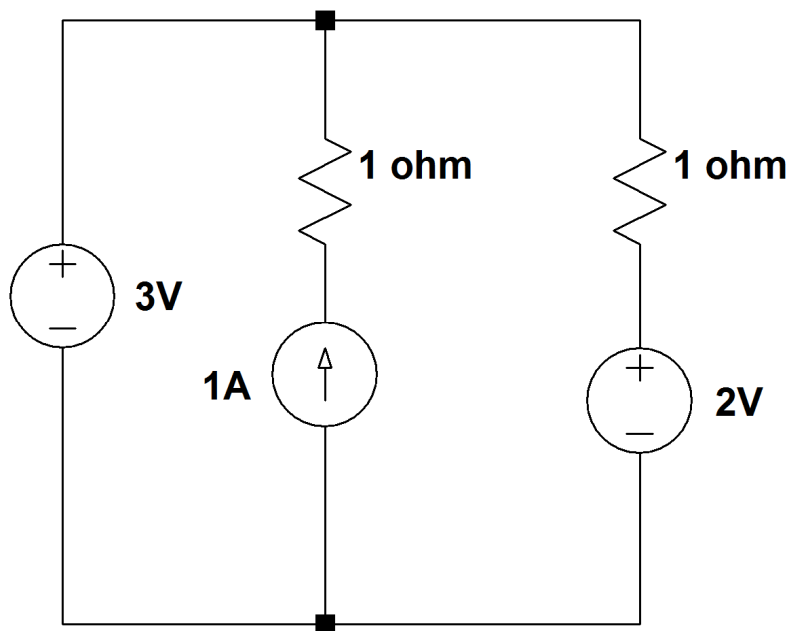
- Find the value of  $I$ . Assume an ideal operational amplifier.
- What is the power of the 1V voltage source?



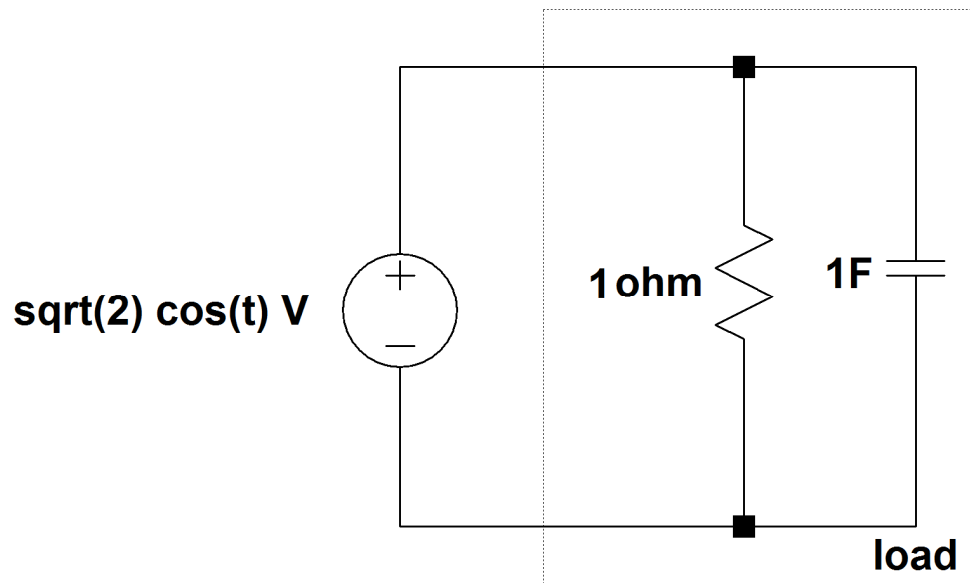
5. (5 points) Find the current  $i(t)$  in the sinusoidal steady state using the principle of superposition.



6. (5 points) Find the power of each circuit element.



7. (5 points) Find the complex power of the load.



8. (5 points) Find the value of a component to add in parallel with the load of question (7) so that the voltage source provides only real power.