

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

**NAME:** \_\_\_\_\_

**INSTRUCTIONS:**

1. **THIS EXAM IS CLOSED BOOK AND CLOSED NOTES.** A “Potentially Useful Facts” sheet is provided.
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 (except public domain figures as noted).

## Potentially Useful Facts

1.  $A \angle \theta = Ae^{j\theta} = A \cos \theta + A \sin \theta j$

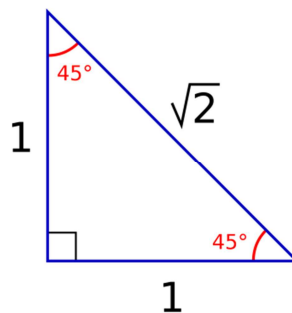
2.  $\vec{Z}_L = j\omega L$

3.  $\vec{Z}_C = \frac{1}{j\omega C}$

4.  $\vec{S} = \vec{V}_{\text{RMS}} (\vec{I}_{\text{RMS}})^*$  (follows passive sign convention)

5.  $V_{\text{RMS}} = \sqrt{\frac{1}{T} \int_0^T v^2(t) dt}$

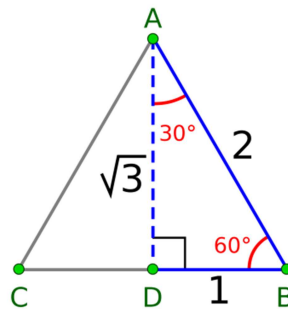
6.



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<https://commons.wikimedia.org/wiki/File:45-45-triangle.svg>

7.

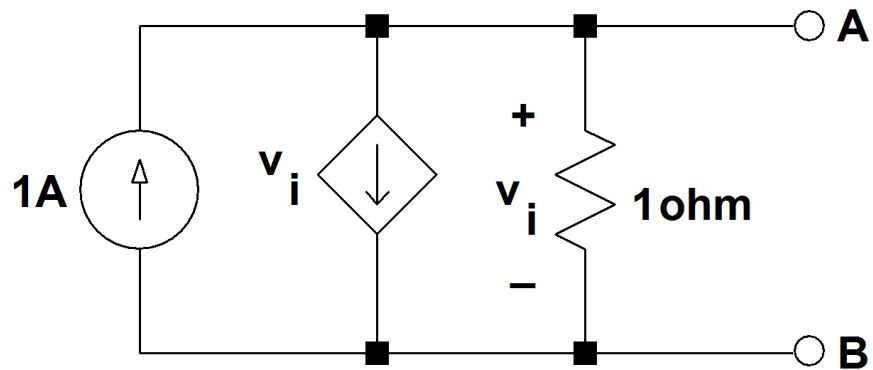


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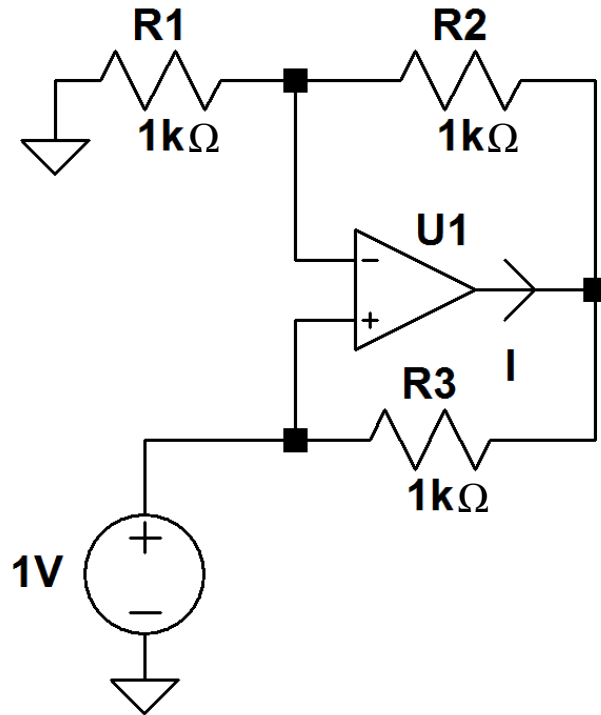
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Maximum exam score is 30 points.

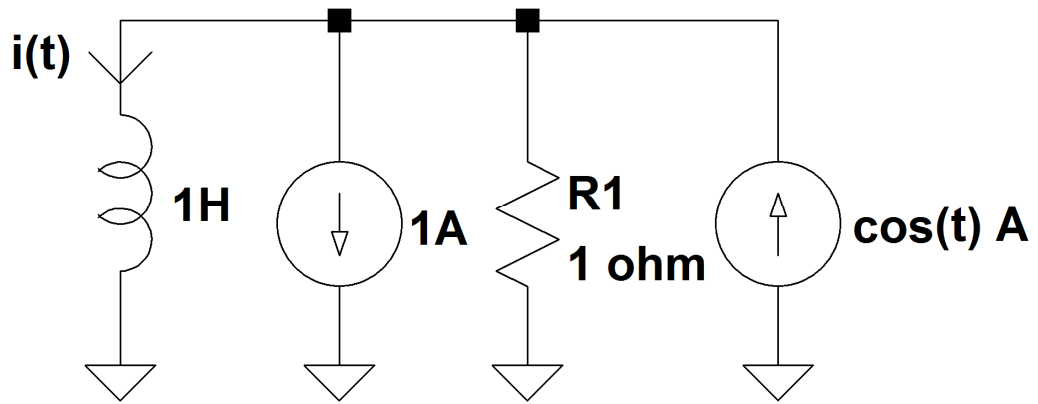
1. (5 points) Thevenize the following circuit “looking into” terminals A-B.  
Be sure to sketch the Thevenin equivalent circuit.



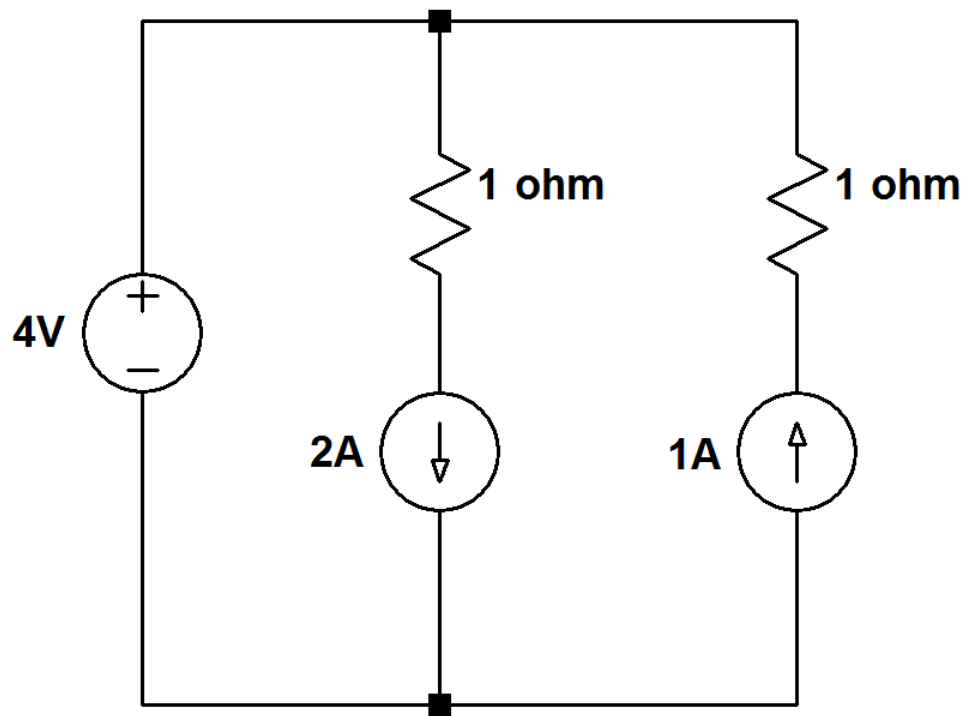
2. (5 points) Assume an ideal operational amplifier.
- Find the value of  $I$ . Assume an ideal operational amplifier.
  - What is the power of the 1V voltage source?



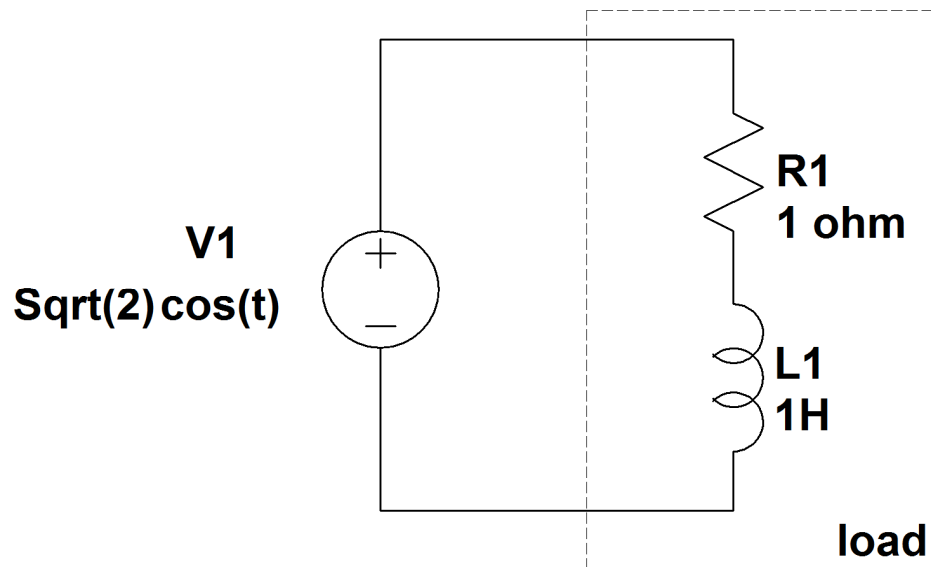
3. (5 points) Find the current  $i(t)$  in the sinusoidal steady state using the principle of superposition.



4. (5 points) Find the power of each circuit element.



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



6. (5 points) Find the value of a component to add in parallel with the load of question (5) so that the voltage source provides only real power.