

**ECE 2100 Circuit Analysis**  
**Summer I 2019**  
**Exam #1**

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

**INSTRUCTIONS:**

1. **THIS EXAM IS CLOSED BOOK AND CLOSED NOTES.**
2. **NO ELECTRONIC DEVICES ARE ALLOWED.**  
All electronic devices, *including watches*, must be stowed away.
3. You may only use the provided pencil.  
All other writing instruments and erasers must be stowed away.
4. No hats or hoods may be worn during the exam.
5. Work each problem in the provided space.
6. Show ALL work required to arrive at a solution for either full or partial credit.
7. READ the entire question before answering.
8. Have your student ID on your desktop for inspection by the instructor.
9. 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. I HAVE VERIFIED THAT THIS EXAM HAS (7) PAGES.**

**SIGNATURE:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

Maximum exam score is 30 points.

1. (3 points) What is the ideal input resistance of a voltmeter?  
Justify your answer by using a Thevenin equivalent circuit.

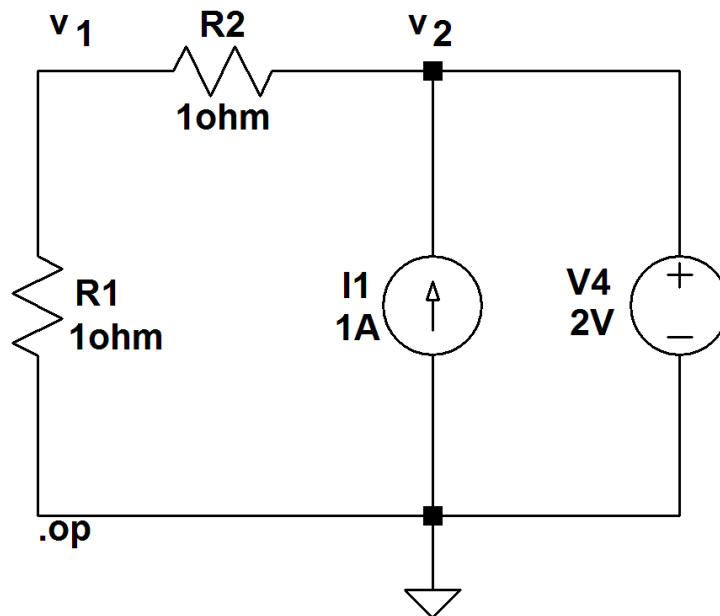
2. (2 points) Consider the system

$$y(t) = T[x(t)] = \frac{dx(t)}{dt}$$

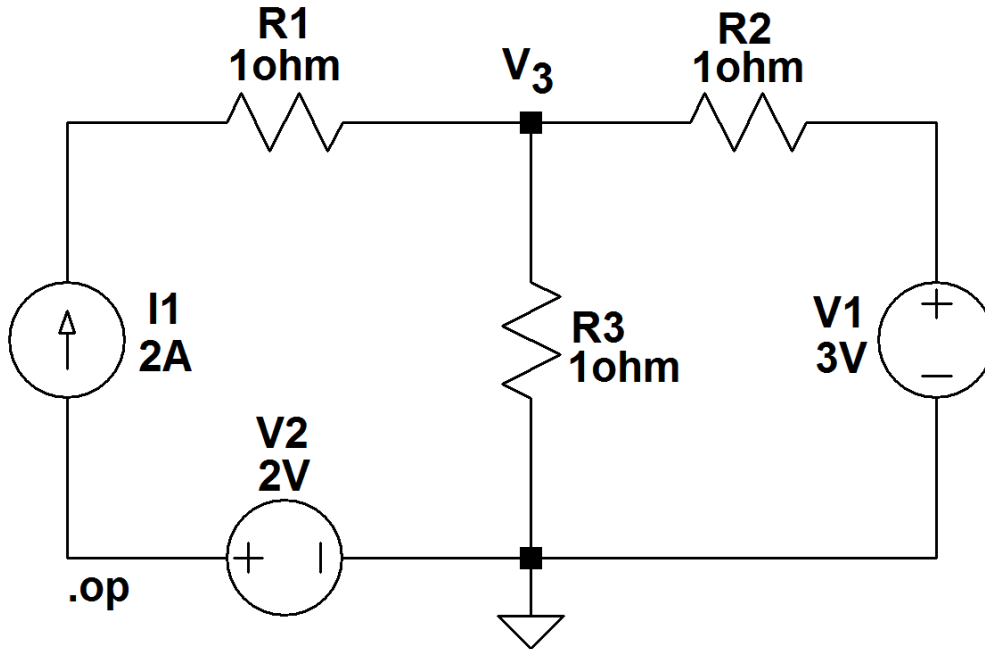
where  $x(t)$  is the time-varying system input and  $y(t)$  is the system output.  
Is this system linear? **Justify your response.**

3. (5 points) A meter movement has a series resistance of  $10\Omega$  and a full scale current of  $10\text{mA}$ . Use this meter movement to design a  $1\text{A}$  full scale ammeter. **Be sure to show a schematic of your design.**

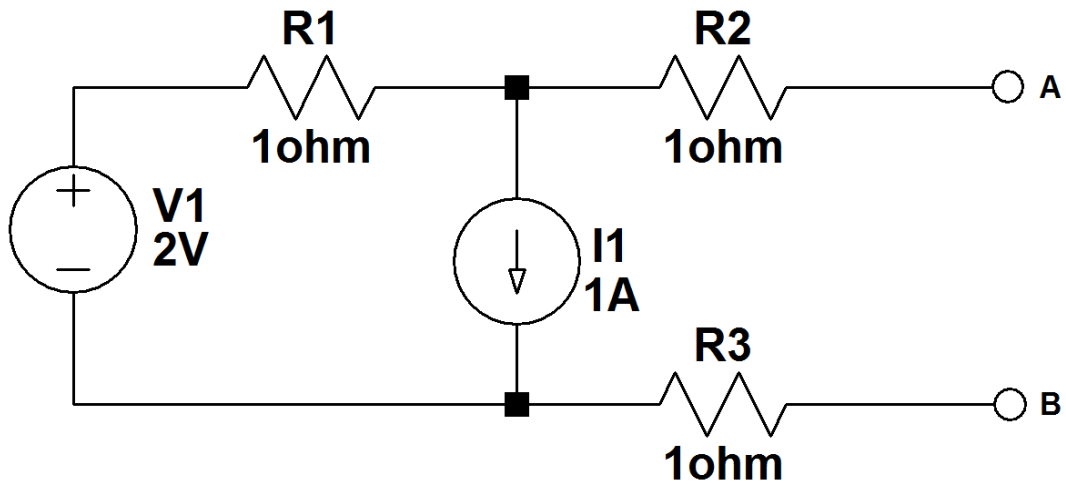
4. (5 points) Find node voltages  $v_1$  and  $v_2$  **using nodal analysis**.  
Use of other methods will result in zero credit.



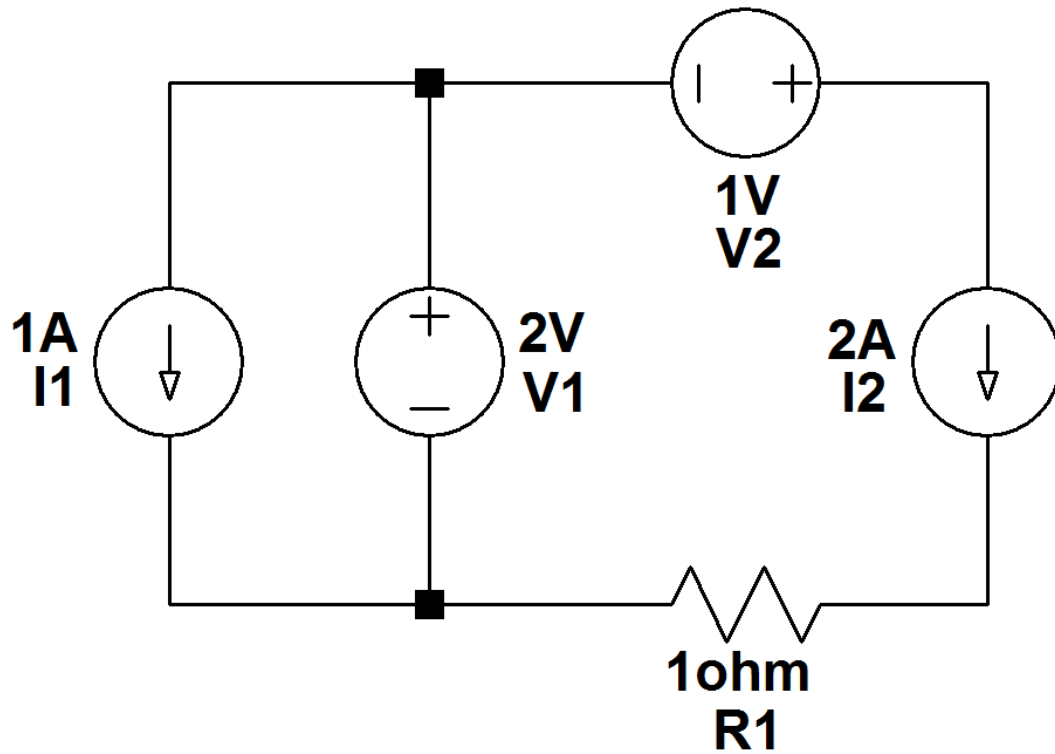
5. (5 points) Find voltage  $V_3$  using the superposition principle.  
Use of other methods will result in zero credit.



6. (5 points) Thevenize the following circuit “looking into” terminals A-B.  
Be sure to sketch the Thevenin equivalent circuit.



7. (5 points) Find the power of each circuit element.  
 You **must** show the voltage across (with polarity) and current through (with direction) each element. Put answers in table.



ELEMENT	POWER
I1	
V1	
V2	
I2	
R1	