

ECE 3200 Electronics II
Spring 2018
Exam #2

NAME: _____

INSTRUCTIONS:

1. **THIS EXAM IS CLOSED BOOK AND CLOSED NOTES.**
2. **YOU MAY USE ONE OF THESE CALCULATORS.**
Circle the one, if any, that you are using:

Casio fx-115/fx-991

HP 33s/35s

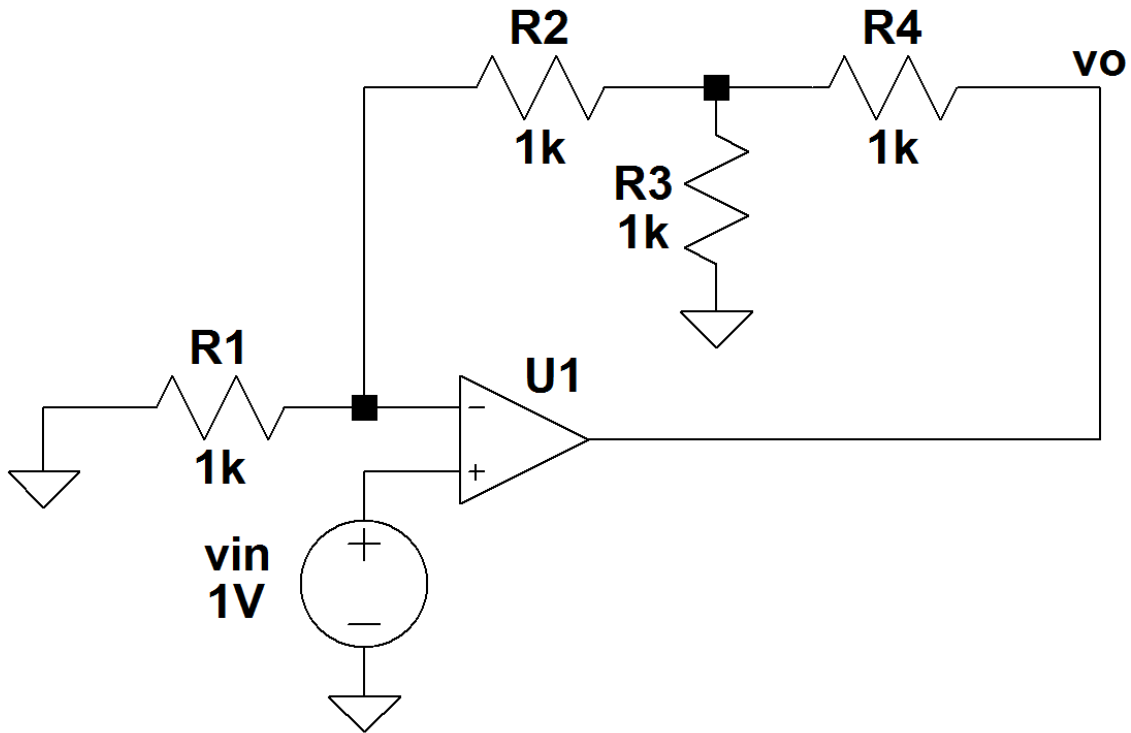
TI 30X/36X
3. **All other electronic devices must be stowed away.**
4. Work each problem in the provided space.
5. Show ALL work required to arrive at a solution for either full or partial credit.
6. READ the entire question before answering.
7. Have your student ID on your desktop for inspection by 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. I HAVE VERIFIED THAT THIS EXAM HAS (8) PAGES.

SIGNATURE: _____ **DATE:** _____

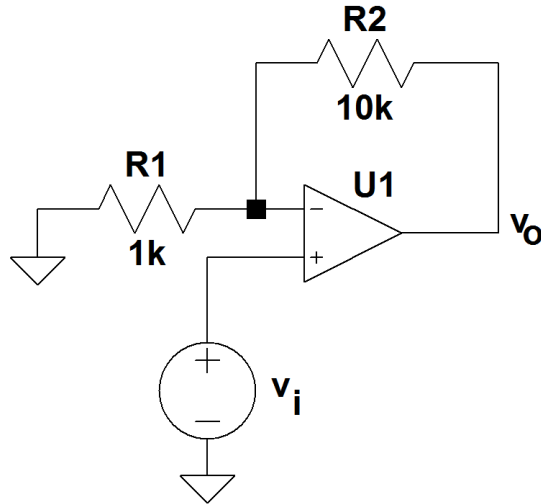
Maximum exam score is 40/30 (problem 4 is worth (10) points extra credit).

1. (10 points) Find node voltage v_o assuming an ideal op-amp.

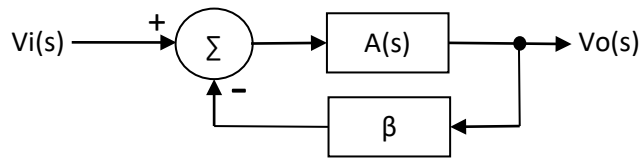


2. A rather unusual op-amp has an open-loop gain $A(s) = \frac{A_o}{s}$ where $A_o=1100$ rad/seconds.

a. (6 points) Find the closed-loop voltage gain $T(s) = \frac{V_o(s)}{V_i(s)}$ of this circuit.



Hint: Model the circuit as a negative feedback system?

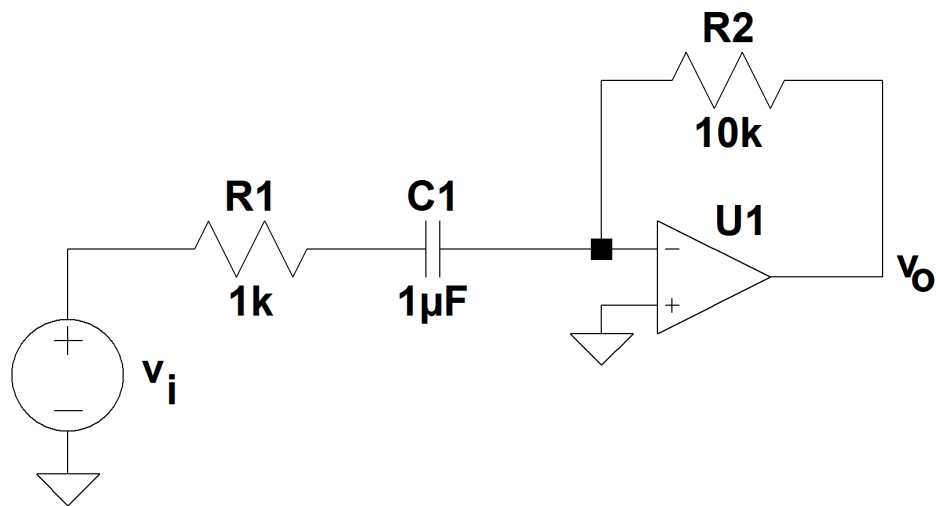


b. (4 points) Provide a Bode magnitude plot of $T(s)$.
A straight-line approximation is sufficient.

EXTRA WORK SPACE FOR PROBLEM 2

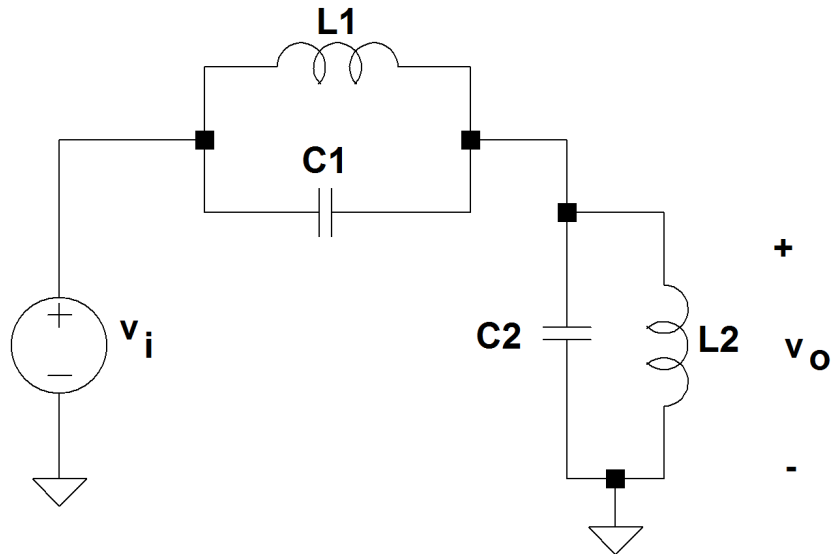
3. The operational amplifier is ideal.

- a. (1 point) Find the low-frequency voltage gain.
- b. (1 point) Find the high-frequency voltage gain.
- c. (4 points) Find the transfer function $T(s) = \frac{V_o(s)}{V_i(s)}$.
- d. (4 points) Sketch the Bode magnitude plot of $T(s)$.
A straight-line approximation is sufficient.



EXTRA WORK SPACE FOR PROBLEM 3

4. EXTRA CREDIT (10 points) Find a non-trivial relationship between the capacitors and inductors so that the voltage gain $\frac{V_o(s)}{V_i(s)}$ is independent of frequency.



EXTRA WORK SPACE FOR PROBLEM 4