UNIVERSITY OF CALIFORNIA, BERKELEY
Department of Electrical Engineering and Computer Sciences

EE100/EE42 Summer 2008
Intro. To Electronics Engineering Bharath "Bart Simpson" Muthuswamy

SAMPLE FINAL

August 15h 2008
Time Allotted: 2 hours

NAME: _____ , _____
(print) Last First

STUDENT ID#:_____ **CIRCLE ONE: EE100 EE42**

I WILL NOT CHEAT ON THIS EXAM. Signature:_____

Note(s):

1. **You will receive [3 pts] for filling out the information above.**
2. **MAKE SURE THE EXAM HAS 11 NUMBERED PAGES.**
3. **This is a CLOSED BOOK exam. However, you may use FOUR 8.5 x 11'' of notes (both sides) and a calculator.**
4. **SHOW YOUR WORK on this exam. MAKE YOUR METHODS CLEAR TO THE GRADER so you can receive partial credit.**
5. **WRITE ANSWERS CLEARLY IN THE SPACES (lines, boxes or axis) PROVIDED.**
6. **Remember to specify units on answers whenever appropriate.**

SCORE: This page: _____ / 3

1:_____/ 22

2:_____/ 25

3:_____/ 25

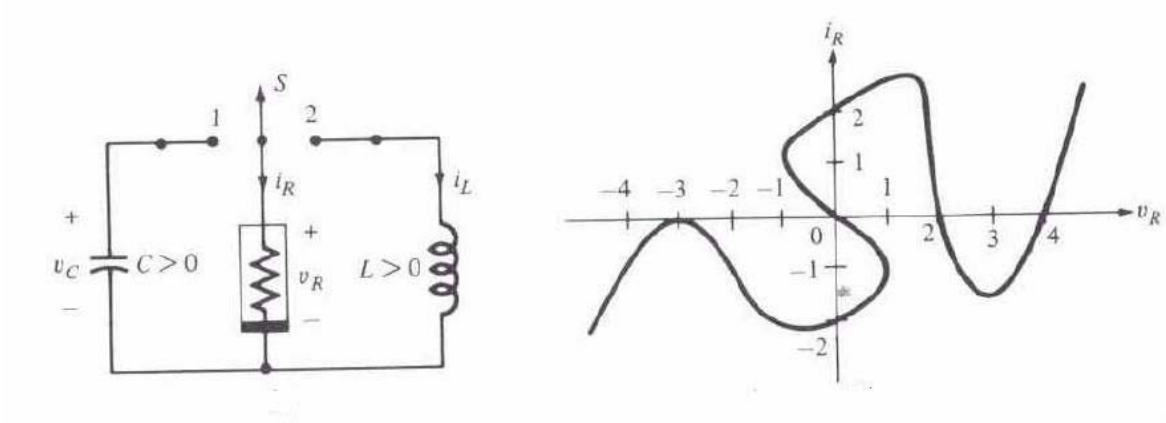
4:_____/ 25

TOTAL:_____/ 100

PROBLEM 1 [22 points]

For the circuit shown below, with the nonlinear i-v characteristic as shown in the figure, find all equilibrium states and classify each as stable or unstable:

(a) When the switch S is in position 1 [**11 points].**
(b) When the switch S is in position 2 **[11 poitns].**



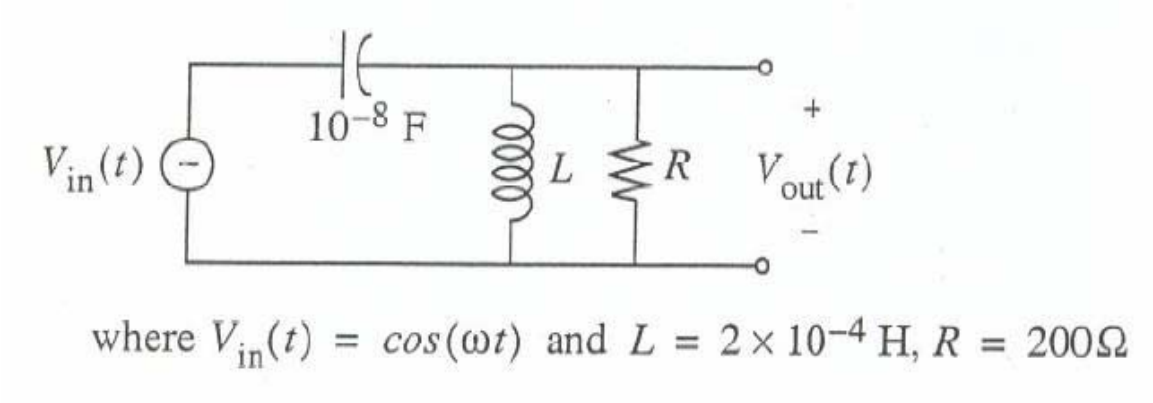
(a) Equilibrium points and stability: _____

(b) Equilibrium points and stability: _____

EXTRA WORKSPACE FOR PROBLEM 1

PROBLEM 2 [25 points]

Consider the circuit shown below.



where $V_{in}(t) = cos(\omega t)$ and $L = 2 \times 10^{-4}$ H, $R = 200\Omega$

(a) What is $|V_{out}(t)|$ for $\omega = 0$? **[6 points]**
(b) What is $|V_{out}(t)|$ for $\omega \rightarrow \infty$? **[6 points]**
(c) What is $|V_{out}(t)|$ for $\omega = 10^6$ rad/sec? **[13 points]**

(a) $|V_{out}(t)|$ for $\omega = 0$: _____

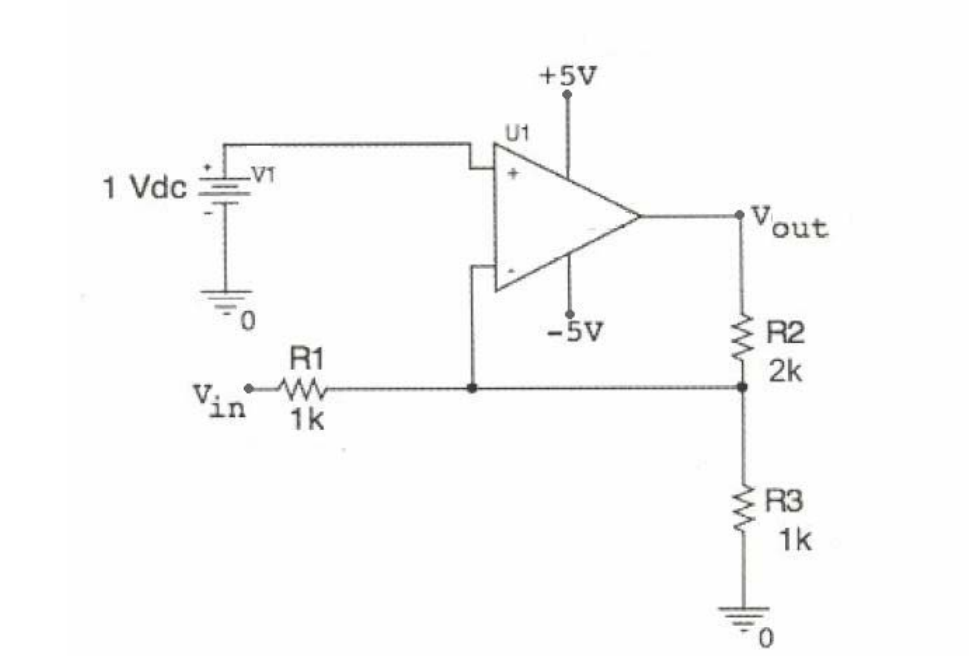
(b) $|V_{out}(t)|$ for $\omega \rightarrow \infty$: _____

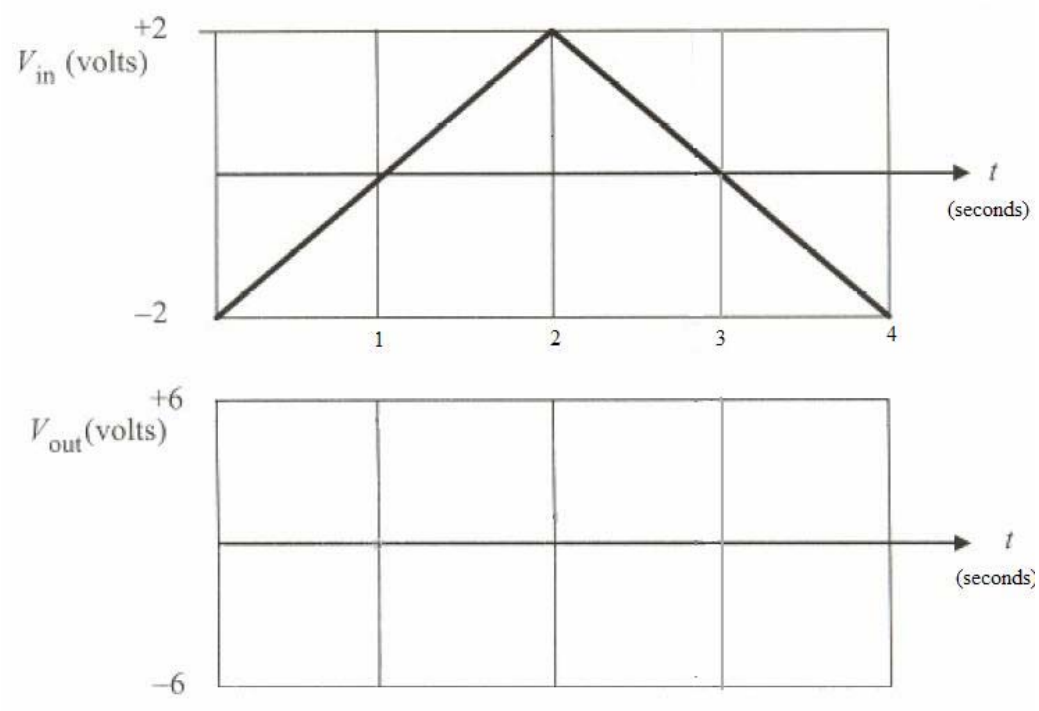
(c) $|V_{out}(t)|$ for $\omega = 10^6$ rad/sec: _____

EXTRA WORKSPACE FOR PROBLEM 2

PROBLEM 3 [25 points]

For the circuit below, sketch the V_{out} vs. t graph in the axis provided for the given input signal. **DO NOT IGNORE THE EFFECTS OF THE OP-AMP RAIL VOLTAGES! DO NOT CHANGE THE LIMITS ON THE GRAPH!**



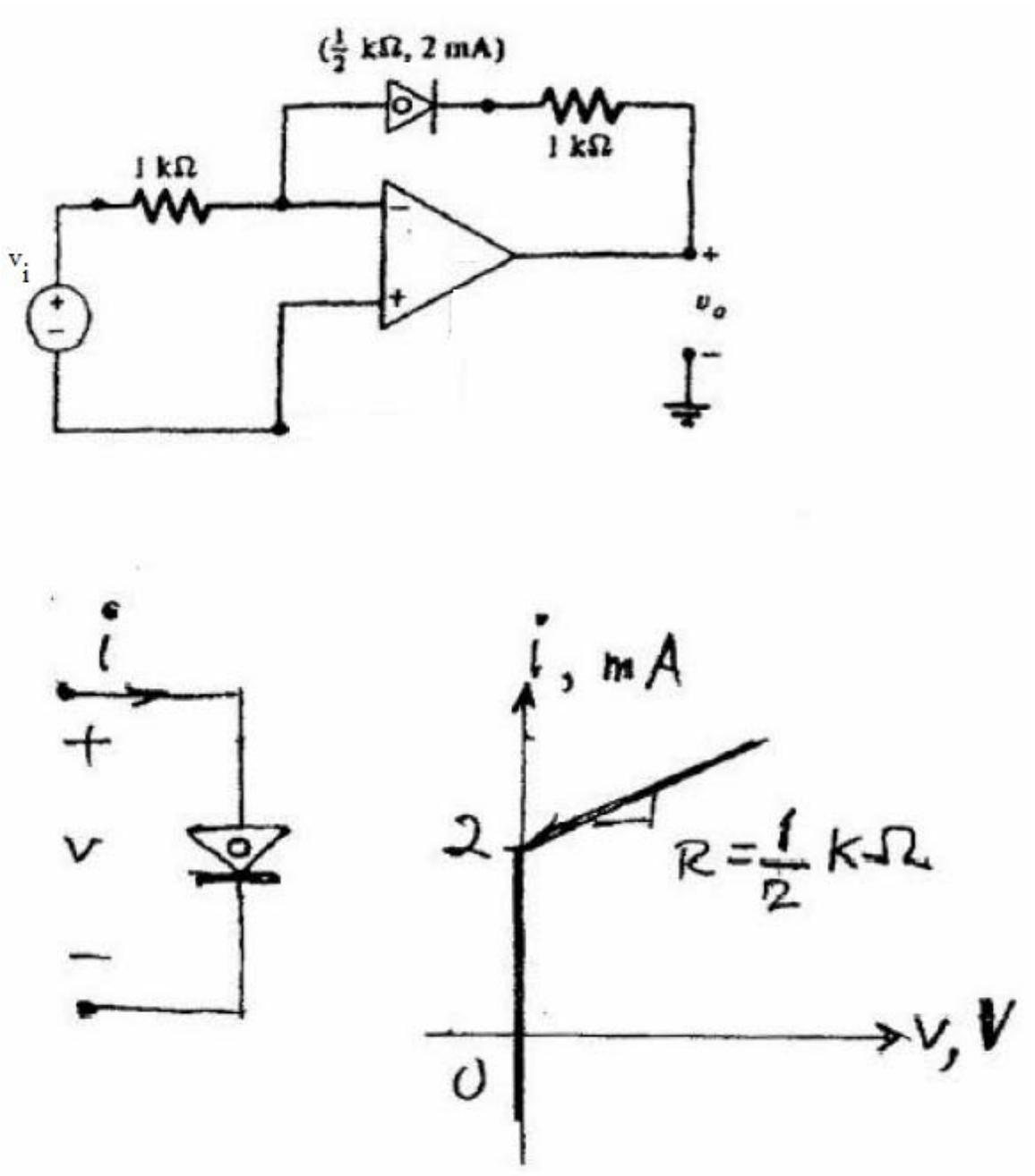


EXTRA WORKSPACE FOR PROBLEM 3

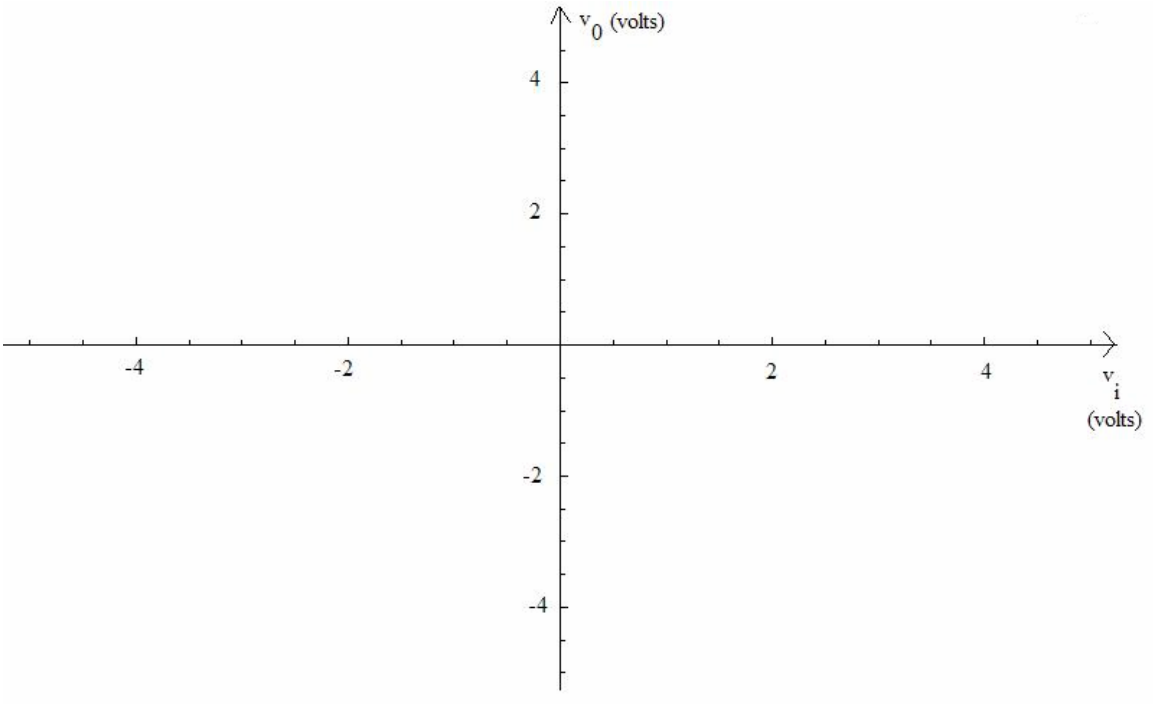
EVEN MORE EXTRA WORKSPACE FOR PROBLEM 3

PROBLEM 4 [25 points]

Assuming the op-amp below is ideal, sketch the v_0 vs. v_i characteristic (i.e.. **the transfer characteristic**) for the circuit below. Notice the model for the "diode" below is **NOT** the ideal diode model. Use the axis provided for your sketch. Mark salient features on your graph (like the slope of a straight-line segment).



Use the axis below for your sketch, DO NOT CHANGE THE LIMITS!



EXTRA WORKSPACE FOR PROBLEM 4