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 points].

(a) Equilibrium points and stability: ________________________________

(b) Equilibrium points and stability: ________________________________
EXTRA WORKSPACE FOR PROBLEM 1
PROBLEM 2 [25 points]

Consider the circuit shown below.

(a) What is $|V_{\text{out}}(t)|$ for $\omega = 0$? [6 points]

(b) What is $|V_{\text{out}}(t)|$ for $\omega \to \infty$? [6 points]

(c) What is $|V_{\text{out}}(t)|$ for $\omega = 10^6$ rad/sec? [13 points]

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

(b) $|V_{\text{out}}(t)|$ for $\omega \to \infty$: ___________________

(c) $|V_{\text{out}}(t)|$ 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. $v_1$ 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