EE100Su08 Lecture #18 (August 6th 2008)

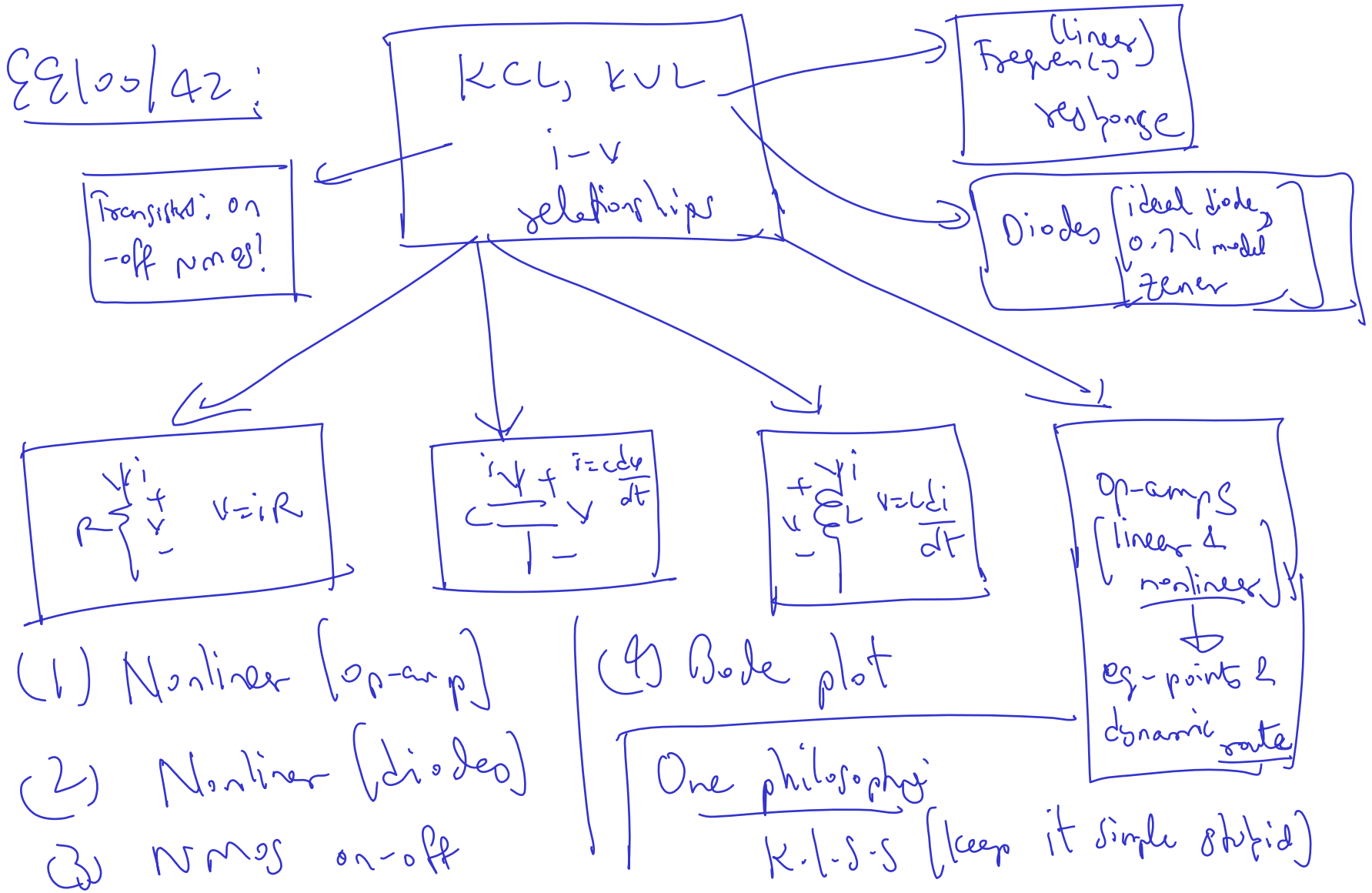
- OUTLINE
  - HWs: Pick up from lab, CHECK SCORES ON BSPACE!
  - Labs: CHECK SCORES ON BSPACE! REGRADE DEADLINE FOR ALL LABS (EXCEPT PROJECT SCORE) IS FRIDAY, AUGUST 8th 2008.
  - **HWs ≥ #4 and PROJECT REGRADES: IF YOU FIND AN ERROR AND YOUR FINAL CLASS GRADE IS AFFECTED, CONTACT BART AFTER THE FINAL. SAME GOES FOR FINAL EXAM! YOU CAN VIEW YOUR FINAL EXAM IN 253 CORY, ASK FOR ROSITA (SHE IS IN BETWEEN 8:00 AM – 12:00 NOON and 1:00 PM – 4:00 PM, Monday – Friday).**
  - Lecture schedule:
    - Today: Review and Course Survey
    - Friday (08/08), Monday (08/11): NO LECTURE
    - Wednesday (08/13): TA review
    - Friday (08/15): Final exam

EE100Su08 Final Exam Information

- Exams homepage updated:
  - http://inst.eecs.berkeley.edu/~ee100/su08/exams/exams.html
- Your course reader:
  - http://inst.eecs.berkeley.edu/~ee100/su08/handouts/ee100su08reader.pdf

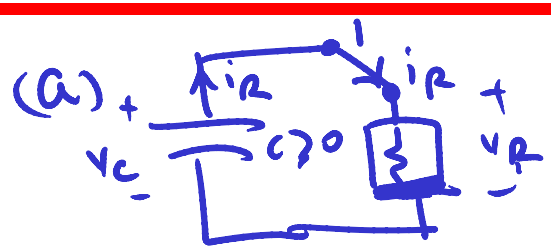
  has a ton of old exam problems! UNDERSTAND and use these as review problems (of course, skip second-order bode plots, semiconductor physics and transistor analog circuits).

EE100Su08 Course Review



Review Problems

(1) Sample final, problem 1:



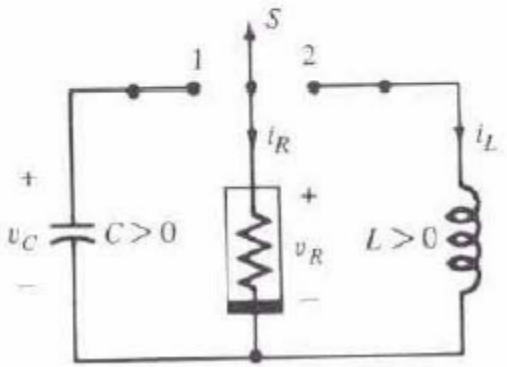
$i_R = -C\frac{dv_R}{dt}$

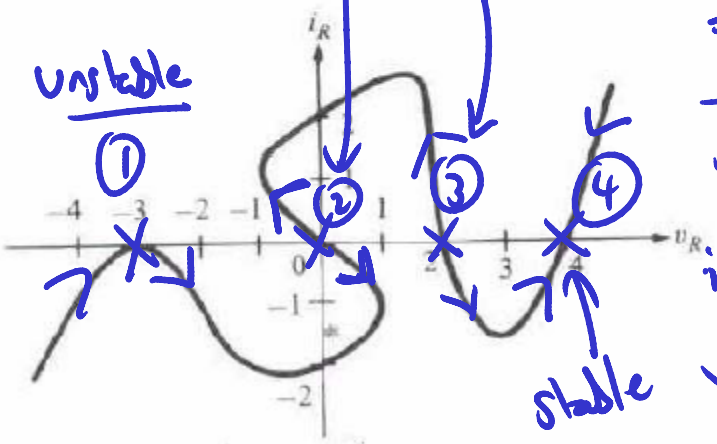
PROBLEM 1 [22 points]

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:

(assume: v_R is in volts, i_R is in amps)

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





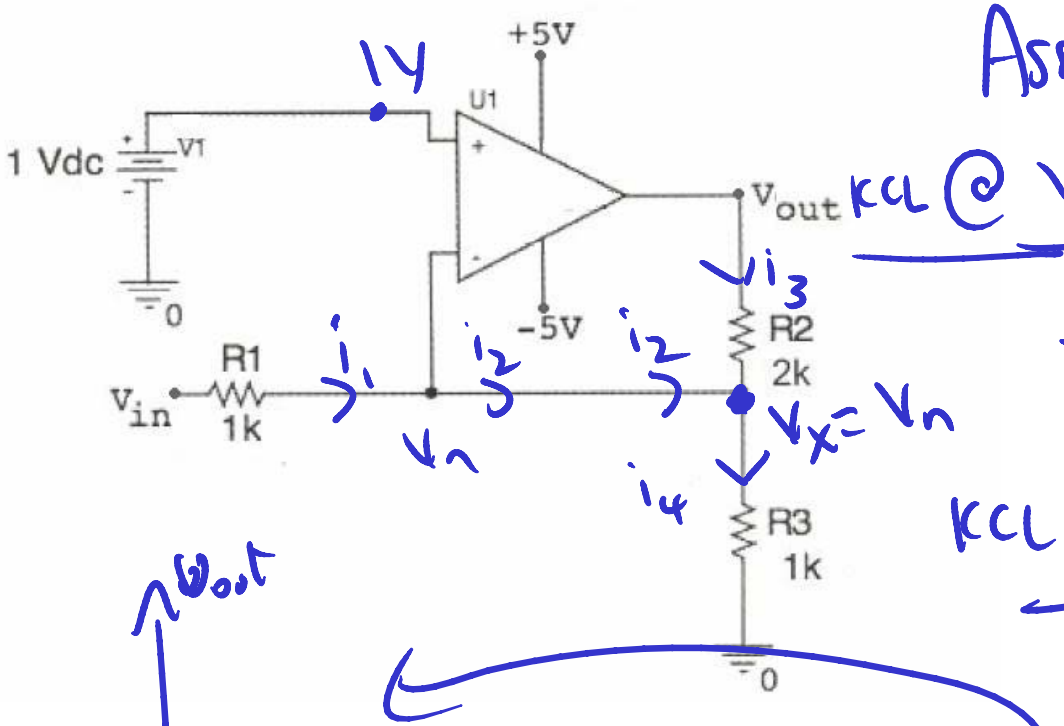
eq. points:
$v_R' = 0$
$\Rightarrow i_R = 0$

Stability:

$i_R > 0$	$i_R < 0$
$v_R' < 0$	$v_R' > 0$

(as eq. points: (−3 V, 0 A), unstable; (0 V, 0 A), unstable; ....)

Review problem 2



Assume $v_p = v_n = 1V$ — ①

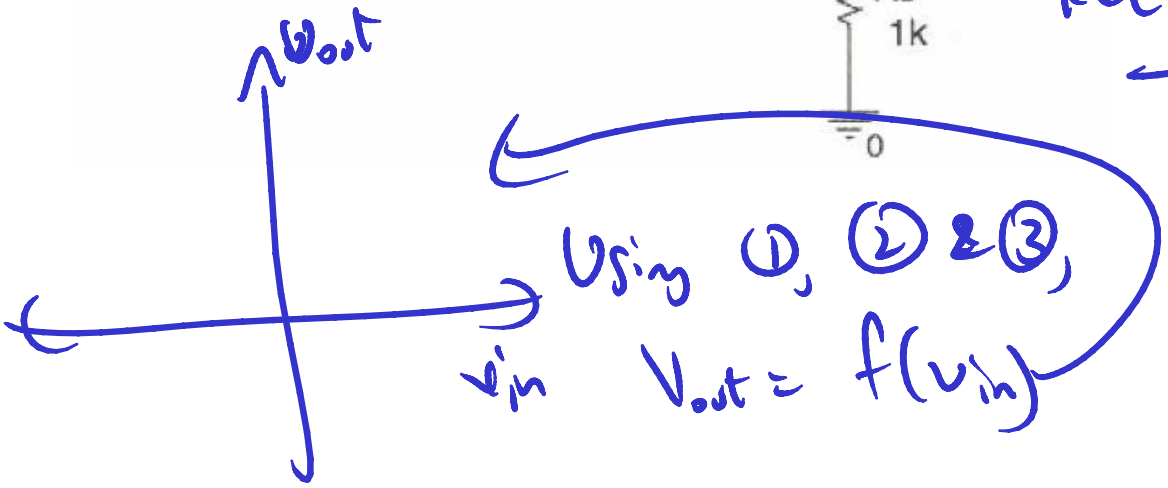
KCL @ V_n: $i_1 = i_2$

$\Rightarrow \frac{V_{in} - V_n}{1k} = i_2$ — ②

KCL @ V_x: $i_2 + i_3 = i_4$

$\Rightarrow i_2 = i_4 - i_3$

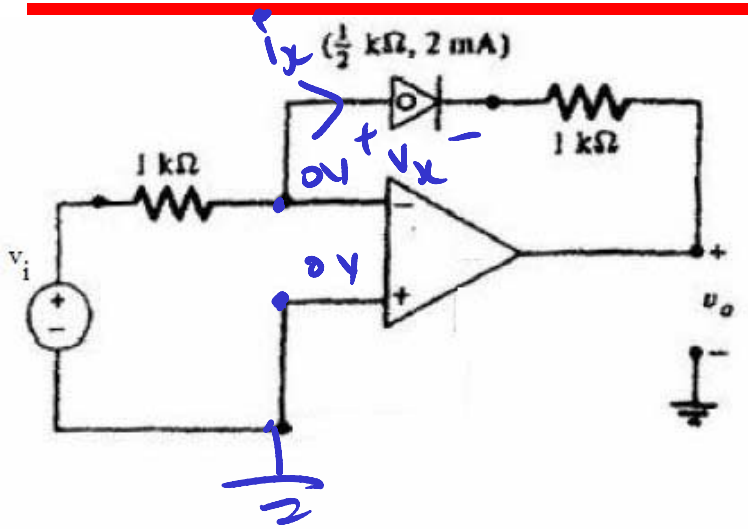
$= \frac{V_n}{1k} - \frac{V_{out} - V_n}{2k}$ — ③

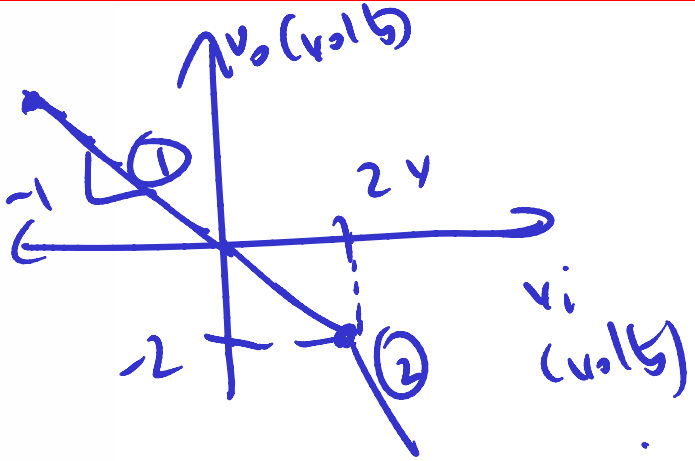


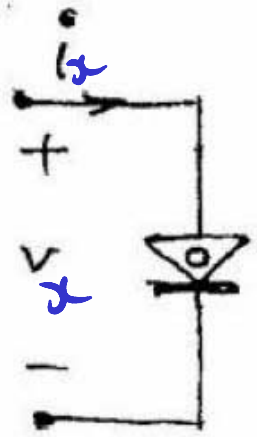
Using ①, ② & ③,

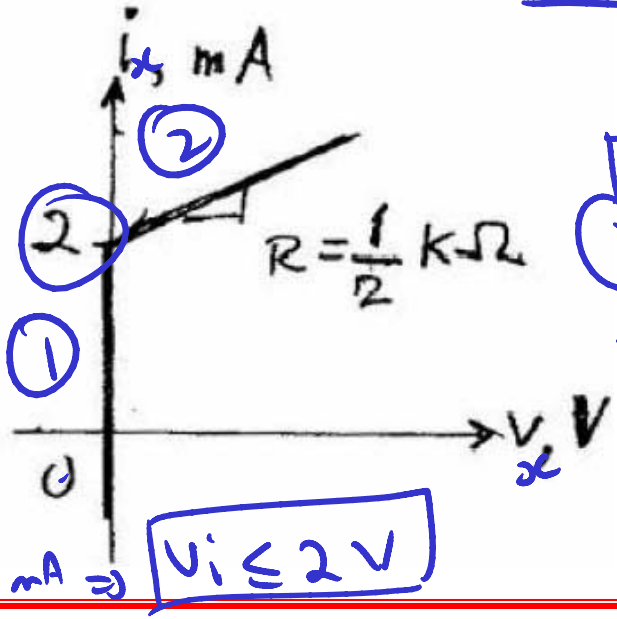
$V_{out} = f(v_{in})$

Review problem 3





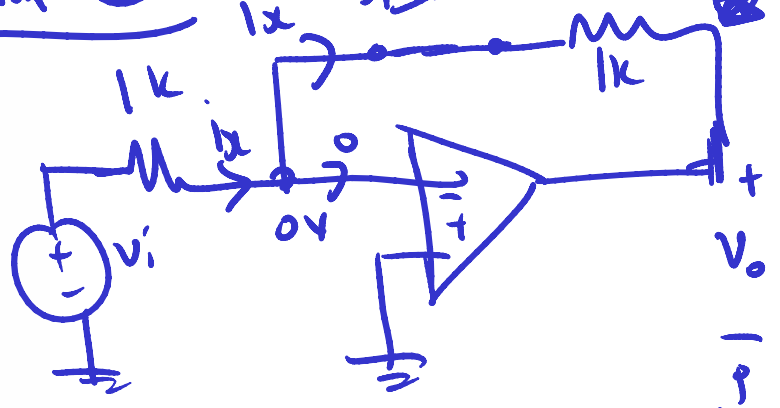




Constraint: $i_x \le 2$ mA

$\Rightarrow (v_i/1k) \le 2$ mA $\Rightarrow$ **$v_i \le 2$ V**

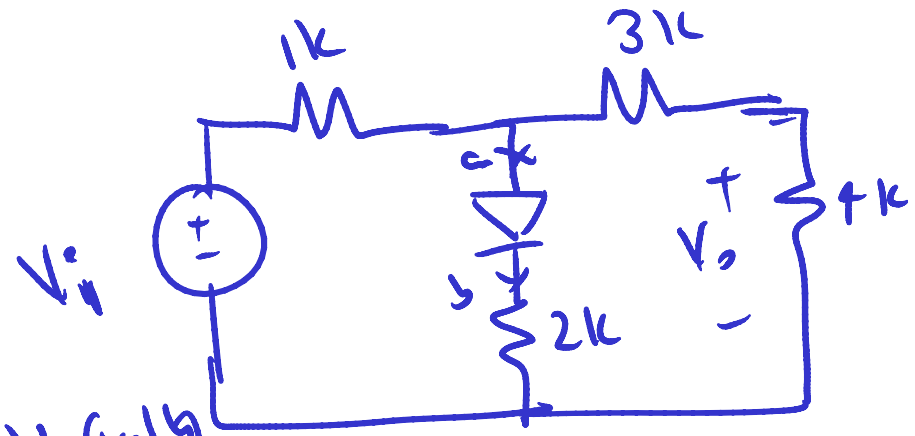
Region ①: $i_x + v_x -$ $i_x \le 2$mA



KCL @ v-: $\frac{v_i - 0}{1k} = \frac{0 - v_o}{1k}$

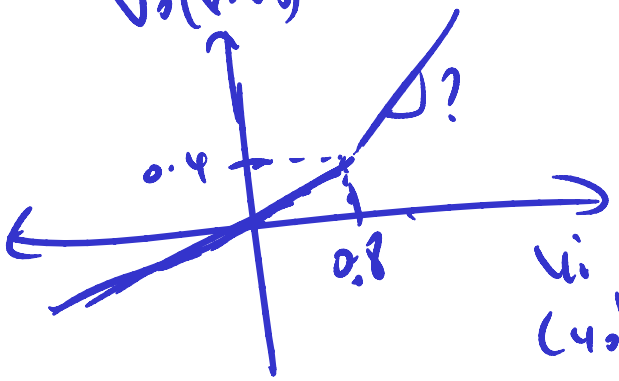
$v_o = -v_i$

Example: Diode 0.7 V model example

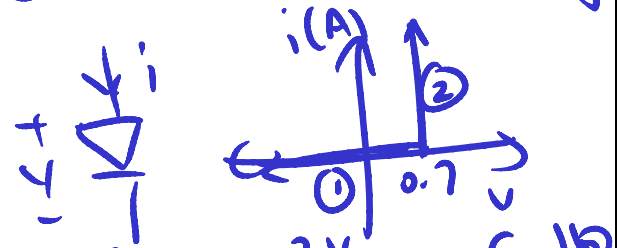


Find V_o as a function of V_i (transfer characteristic)

[Assume diode model is the 0.7 V drop model]



$V = \frac{7k}{8k} V_i$



Region ①: $V \le 0.7$ V

Constraint:

$\frac{7}{8} V_i \le 0.7$ V

$\Rightarrow V_i \le \frac{5.6}{7}$

$V_o = \frac{4k}{4k+3k+1k} \cdot V_i \Rightarrow V_o = \frac{1}{2} V_i$

$(V \le 0.7$ V$)$