Lecture 9 - LabVIEW/ Midterm Review

- Grades (HW1, HW2) up later today (10)
- Review today tomorrow
- Midterm
  - Justin's review on O/A Wednesday
  - Extra Q&A check Exams link on EE100 homepage
This week you only have lab (LabVIEW)

http://inst.eecs.berkeley.edu/~resg/LabVIEW

(linked off lab homepage). Click on references for

resource

Book, pp. 426-436.

Midterm - Format: 4 questions [may contain one

two part]

(a) Model Analysis

(a.2) RC and/or RL
\( (\text{Q. 3}) \)

Theorem

(b) Same transform

(c) AC analysis (SIMME)

(Q. 4) ?? → maybe hard.

\[ E = G \cdot \mathcal{G} \]

I was going to be on the midterm, but I asked about in 04.

Find & plot \( V_c(t) \) assuming \( V_c(0) = 0 \) V

& all elements are ideal.

\[ 1 \text{A} \]

\[ V_c(t) = ? \quad t \geq 0 \]
\[ v_c(t) = \begin{cases} \frac{1}{2} \frac{\tau}{v_i} & \text{if } t < \tau \\ 0 & \text{if } t \geq \tau \end{cases} \]

\[ v_i = \frac{1}{r} \left( v_i - V_C(t) \right) \]
(Q:) Do you need supernode in the test?

(A:) No, you don't need it, you could use it.

$$E_3$$

(Schurf node equations) to solve circuit above for unknown node voltages.

without

with supernode
\[ I_{CL} @ V_m: \quad \frac{1 - V_m}{2 \epsilon} = i_{N} + i_D \]

\[ |CCL @ V_n: |mA + i_D = i_n \]

**Step 1:** Identify floating voltage sources, i.e., one end of the voltage source is not grounded.
\[ I_{\text{mA}} + i_0 = \frac{V_n}{5k} \]

\[ I_{\text{mA}} + i_n = i_{n1} + i_n \]

\[ I = \frac{1 - V_m}{1k} + I_{\text{mA}} = \text{BesselFunction} (V_m) \]

\[ V_n - V_m = 5V_m \]

(2) KCL at supermode:

(3) "Look" inside supermode to obtain KVL constraint equation
E8. Quitchie (aka 10 second)

Find $V_2$.
\[ V_I = \left( \frac{4 \text{K}}{4 \text{K} + 4 \text{K}} \right) \times 12 \text{V} = 6 \text{V} \] (voltage divider)
Note: No discussion today.
Extra off on Thursday (for 400 Corp. 5-9 pm) (in addition to Wed. off)
\( V_{oc} = 0 \text{ V} \)

Special case: only dependent source in independent sources in circuit to activate

\[ V_{oc} = 0 \text{ V} \]
\[ R_m = ? \]

\[ 40 \Omega \leq 4 \Omega \]

\[ V_{test} = V_{10} + 40I (\text{KVL}) \]

\[ V_{test} = I(10) + 40I \]

But, \[ I_{test} = I \Rightarrow \sqrt{R_m} = 50 \Omega \]
In the circuit above, the transistor model is:

\[ E = \text{considered as a hard problem} \]
(Q:) Find $V_{DS}$.

**Step 1:** Replace TI with models.

Now, use circuit analysis. I recommend you pick a ground.
\[ V_{as} = V_a - V_s \]

\[ \Rightarrow V_{as} = 6 - V_s \]

\[ V_s = \left( -2 \right) \left( 5 V_{as} \right) \]

\[ \Rightarrow V_{as} = 6 - 10 V_{as} \]
\[ V_{cs} = 6 \Rightarrow V_{cs} = \frac{6}{11} V \]

\[ V_{c} - V_{s} = \frac{6}{11} V \Rightarrow V_{s} = 6 - \frac{6}{11} \]

\[ V_{s} = \frac{60}{11} V \]

\[ \text{KVL around loop 2:} \quad V_{ds} = V_D - V_S \]
\[ V_{DS} = \frac{-5}{11} \text{V} \]