Lecture 14 - MIDTERM REVIEW

Administrivia: My office hours today will be in 277 Cory, instead of Fδm from 5pm - 9pm. If you come after 6:00pm, please wait in front of 2nd floor entrance, Someone will let you in!

Midterm → Next Thursday (03/10/05)

- 2 pm - 5 pm in 299 Cory "makeup" (25 people)
- 6 pm - 9 pm in 1 Pimentel

No class on 03/10

No blue books necessary.

Next week: Tuesday: (03/08/05

- In-class Q/A (optional)
- Justin's review session in 10 Evans from 5-7

Whats on midterm

(1) Nodal analysis

(2) Thevenin/Norton

(3) Source transforms ☺

(4) RC/RL circuits

(5) Dependent sources

(6) Maximum power transfer

(7) Supernode

(8) Voltage divider

What isn't

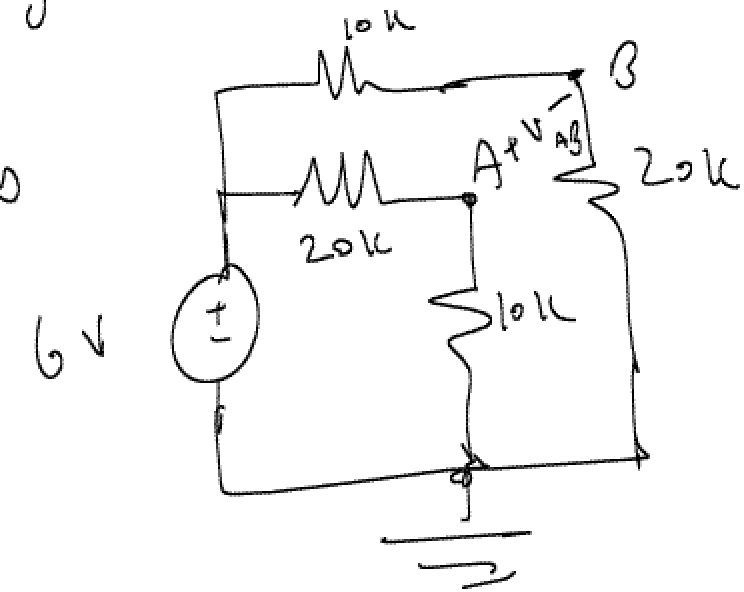
mesh analysis, Superposition — you can use if you want to

"No lab"

<u>How to prepare for MT 1</u>

(1) Quickies from Review problems ∈ should not take you more than 5 minutes.

Eg [C0



V_{AB} = ______

Concept(s): Voltage across parallel elements & Voltage divider

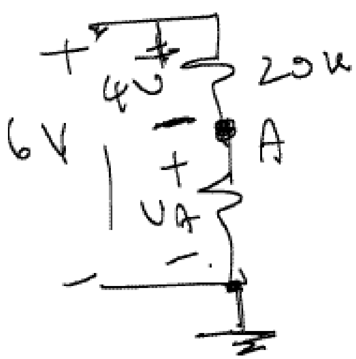
⇒ in parallel

$$V_A = \left(\frac{10k}{10k+20k}\right)6 = 2\ V$$

$$V_B = \left(\frac{20k}{10k+20k}\right)\cdot 6 = 4\ V$$

$$\therefore\ \boxed{V_{AB} = V_A - V_B = -2\ V}$$

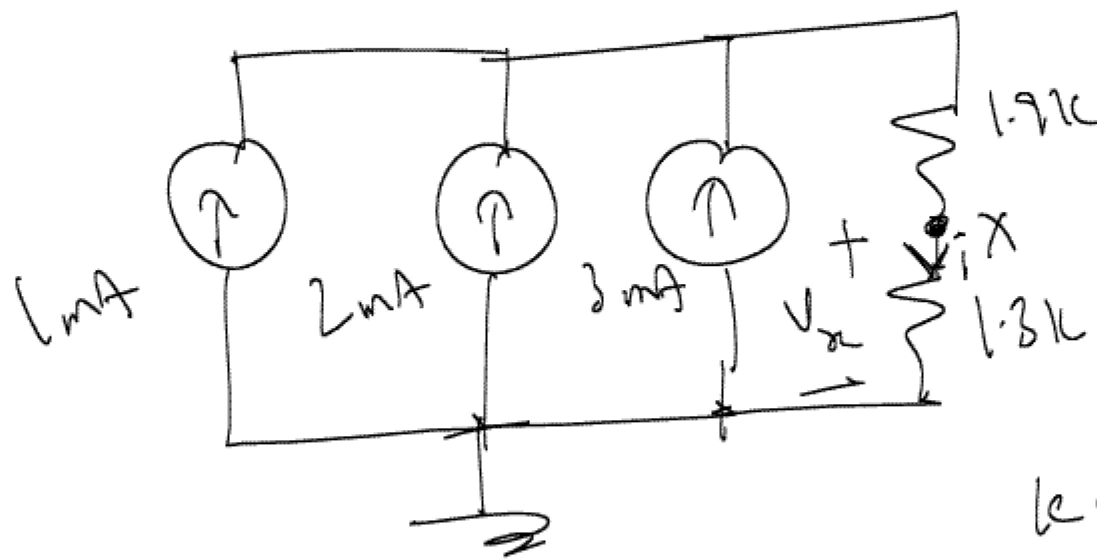
(Q:)



$V_A = 2\ V$ (KVL)

↓ refers to voltage at node A w.r.t ⏚

(g)



$V_x =$ ______

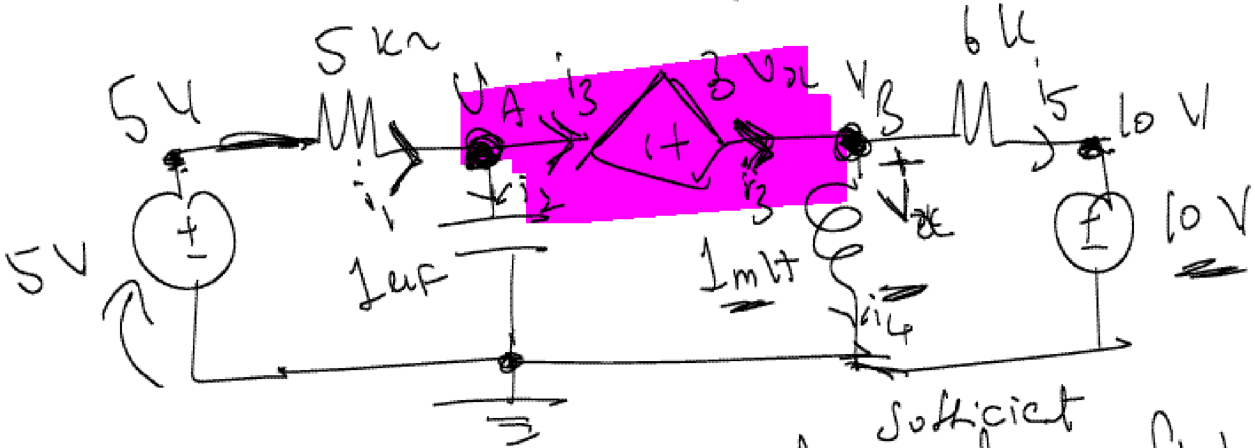
KCL

$V_x = i\,(1.3\,k) = [1\,mA + 2\,mA + 3\,mA](1.3\,k)$

$= (6\,mA)(1.3\,k)$

$= 7.8\,V$

(Eg 2) Nodal analysis: Setup equations only



(Q:) Setup node equations sufficient to find the unknown node voltages. Do NOT solve!

$$i_1 = \frac{5 - V_A}{5k}, \quad i_2 = (1uF)\frac{dV_A}{dt}, \quad i_3 = ?, \quad i_4 = \frac{1}{1mH}\int v_B\,dt$$

$$i_5 = (V_B - 10/6k)$$

Step 1: Label Ground node

Step 2: Label unknown node voltages

Step 3: Write KCL equation at unknown node (OR) Supernode

↓

KCL @ V_A: $i_1 = i_2 + i_3$ KCL @ V_B: $i_3 = i_4 + i_5$

Step 4: Rewrite currents in KCL in terms of node voltages

(Use constraint equation from dependent sources, if necessary)

$$\left(\frac{5 - v_A}{5k}\right) = (1\,\mu F)\frac{dv_A}{dt} + i_3$$

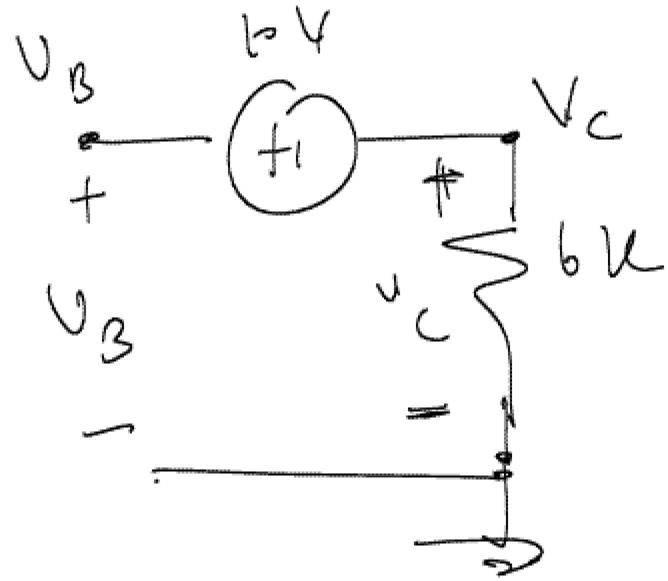
$$i_3 = \frac{1}{1\,mH}\int v_B\,dt + \left(\frac{v_B - 10}{6k}\right)$$

Constraint eqn:

$$V_B - V_A = 3V_x$$

$$V_x = v_B$$

(Q:) Suppose:

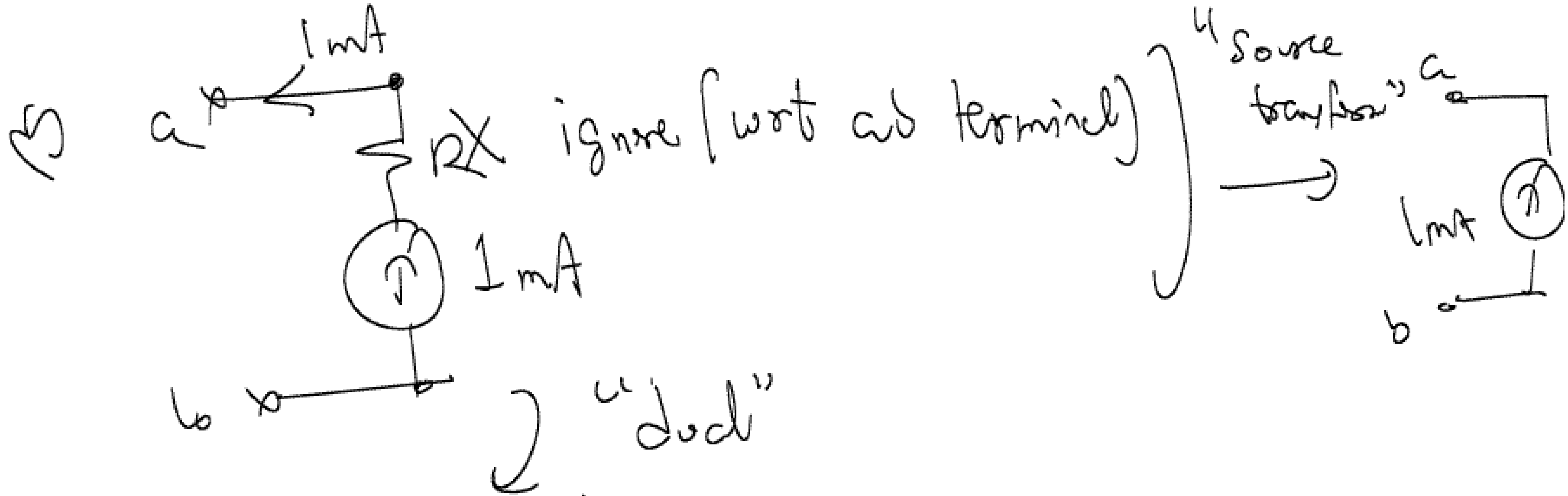


KVL: $V_B - V_C = 10$

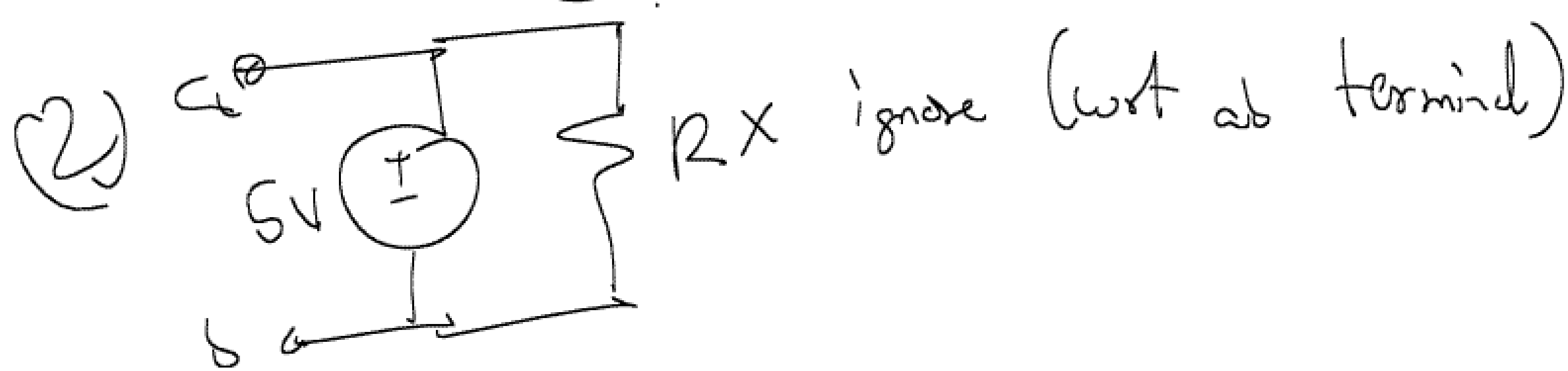
$\Rightarrow \boxed{V_C = V_B - 10}$

Miscellaneous stuff about midterm

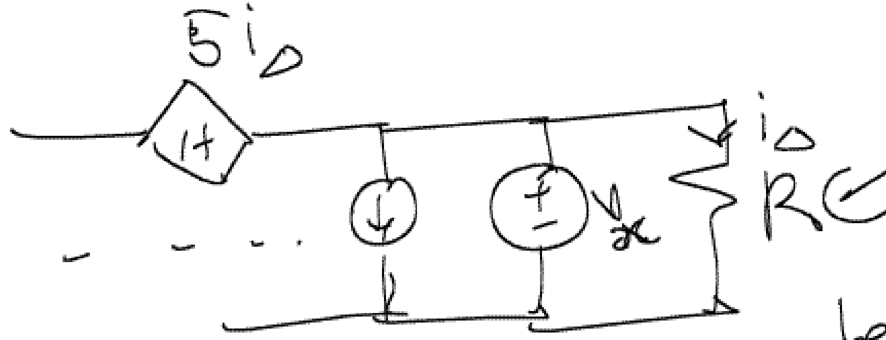
(1)



(2)



Note:



Cannot ignore it because you need R to find i_Δ

$$i_\Delta = \frac{V_x}{R}$$

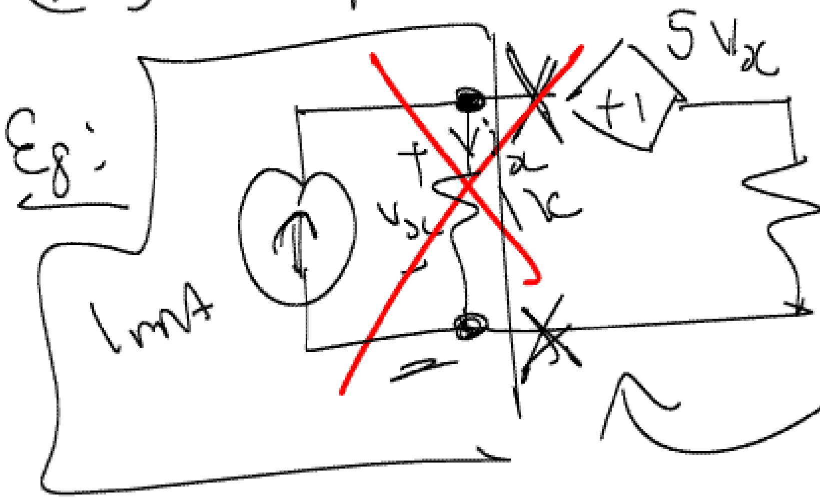
(3) RC ckt ⟹ Homework 6

(4) If you understand all homeworks ⟹ you should be set. ☺

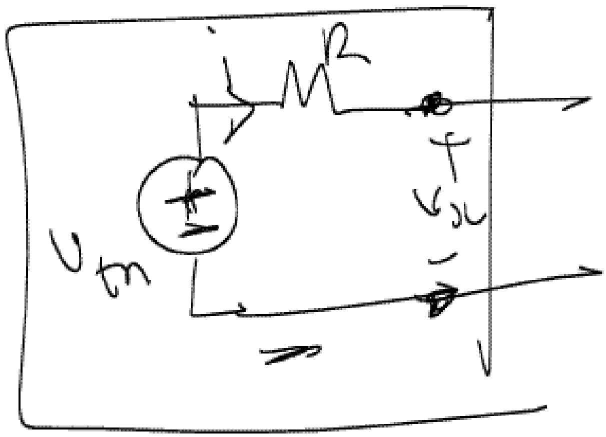
(Q:) If you have circuit with both independent & dependent sources, can you do source transform on independent source?

(A:) Depends on the circuit.

Eg:

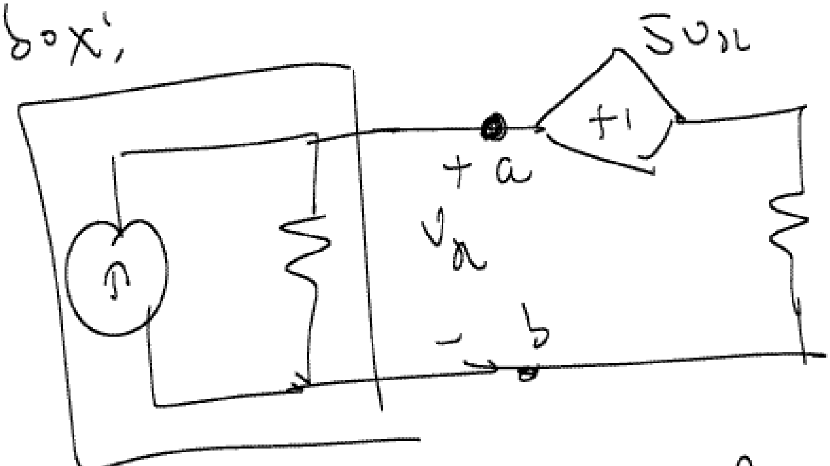


Not recommended, but you could do it & in this case its actually easy [because of "infinite



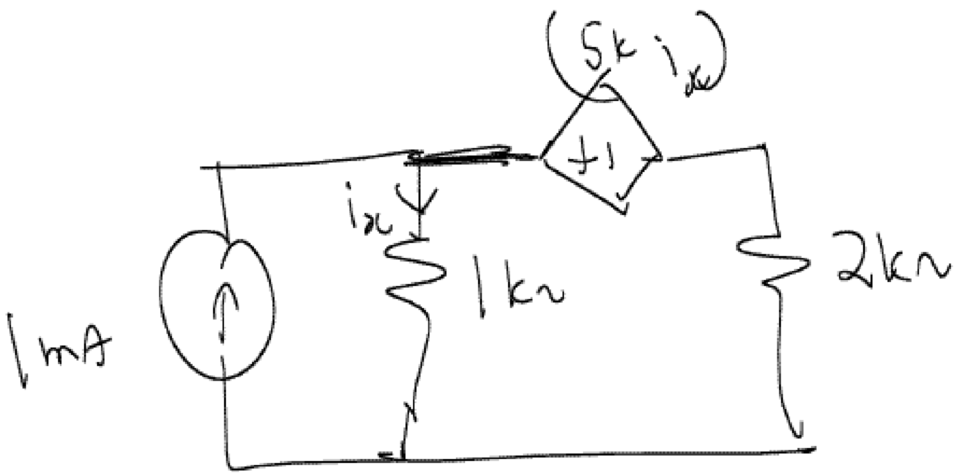
wisdom", I thought this wasn't the case toward the end of class].

In this case, you could "move v_x" out of the box:



Like someone in the first row pointed out,

v_{oc} is the voltage across ab, so in this case source transform is easy. But, consider this:



Note that you can do a source transform, but you have to keep track of where i_x is!