

Instructions

- Start working on the practice problems right away.
 - The problems themselves are available at the copy center and on our course website.
 - No bench # assigned today.
- Make sure that you know which session of the exam you are assigned to next week.
- Dr. Prapun will talk about the exam and give a short review later (when most students have arrived).

Basic Elec. Engr. Lab

ECS 204

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Practice Session for Midterm Exam

Midterm

- Work alone
- Circuit construction and measurement
- The TAs will not help you debug your circuit.
 - Debug your own circuit.

Exam Sessions

- Four sessions
- session a: 9:30 – 10:30 AM
 - Prepare to stay until 10:40.
- session b: 10:40 – 11:40 AM
 - Must be in the check-in room @ 10:35. (-5 pt for late arrival)
- session c: 1:20 – 2:20 PM
 - Prepare to stay until 2:30.
- session d: 2:30 – 3:30 PM
 - Must be in the check-in room @ 2:25. (-5 pt for late arrival)

Exam Instructions (1/3)

- Five minutes for cleaning up / organizing your bench at the end of your session.
 - - 5 pt for late or messy bench
- **Do not enter the lab before your exam time.**
 - Must be in the check-in room at least 5 minutes before your exam time.
- Bench numbers for taking exam will be randomly assigned.
 - You will know your bench number right before you enter the exam room.

Exam Instructions (2/3)

- Closed book. Closed notes.
- *No calculator.*
- For the problems that ask for TA's signatures, lack of the signature(s) means *no credit for the whole part.*
 - Having the signatures mean that the values recorded are the same as the values measured.
 - These signatures do not guarantee that you have the correct answers.
 - You need a new TA signature if you change your answer.
- When possible, record *at least two decimal places* from the DMM. Do not write 12 mA when you see 12.00 mA on the DMM's display.

Exam Instructions (3/3)

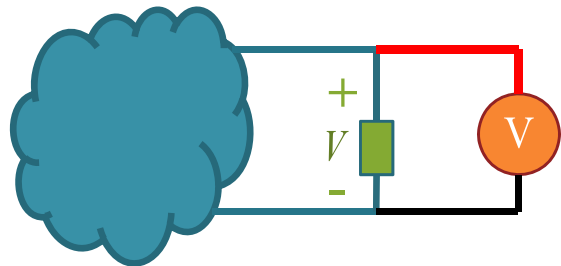
- **Read the instructions and the questions carefully.**
- Allocate your time wisely.
- Some easy questions give many points.
 - Difficult questions may give only a couple points.
- Units are important.
- Do not forget to write your **first name and the last three digits of your ID** on each page of your examination paper, starting from page 2.
- All resistors that you need will be provided on your desk.
 - Do not use the resistors in the box.
- Organize your desk before you leave the exam room.
 - Make sure that the resistors provided are back to their original place on your bench.

Tips

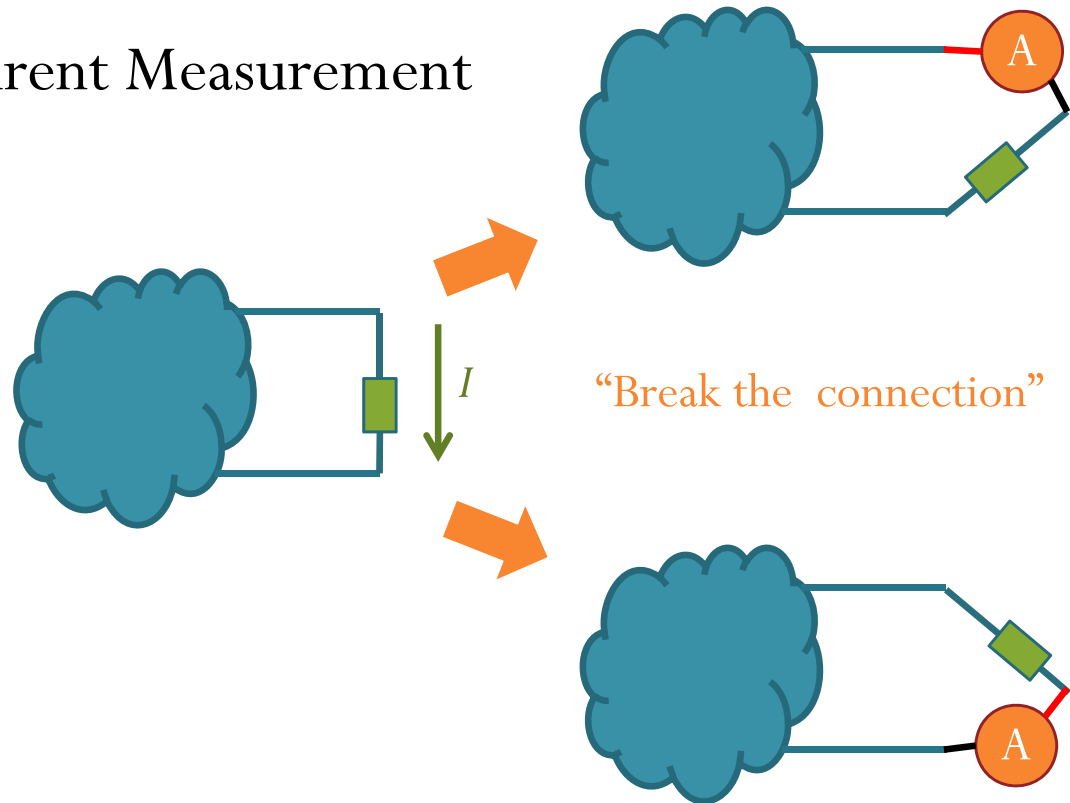
- Be extra careful with resistor values!
 - Using wrong one costs you most if not all of the scores for that part.
- Check the current-limit light warning on power supply
- Usually, connecting the circuit in the same way (components arranged in the same positions and orientation) that is drawn on the exam sheet will make debugging and modification easier.
- Review how to use “continuity test” on DMM
 - Useful for checking broken wires
- Battery indicator on DMM
- Look at what the signature is for.
- Actual exam is 1 hour.
 - You should be able to finish the practice problems in 45 minutes.

Voltage vs. Current Measurements

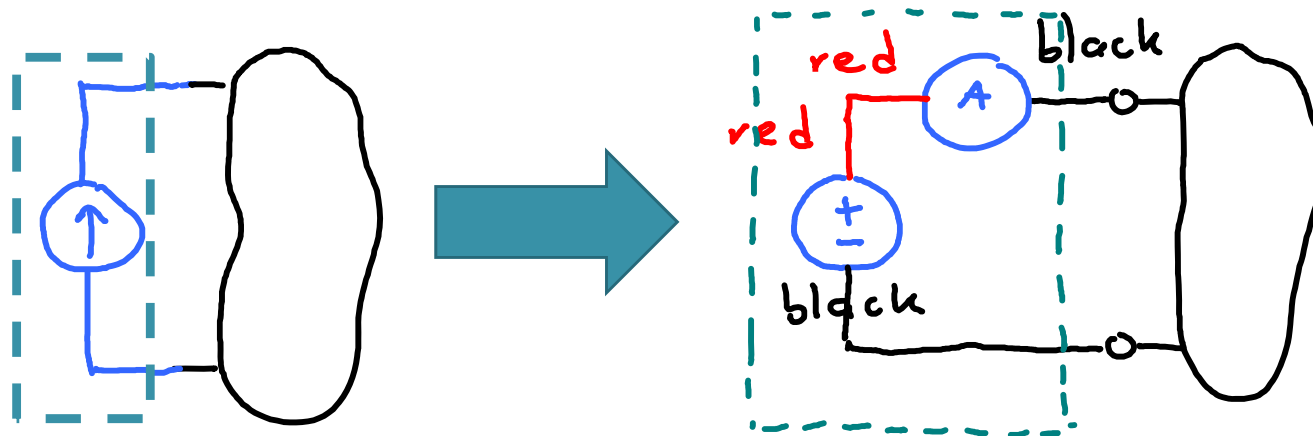
Voltage Measurement



Current Measurement



Constructing “fake” current source

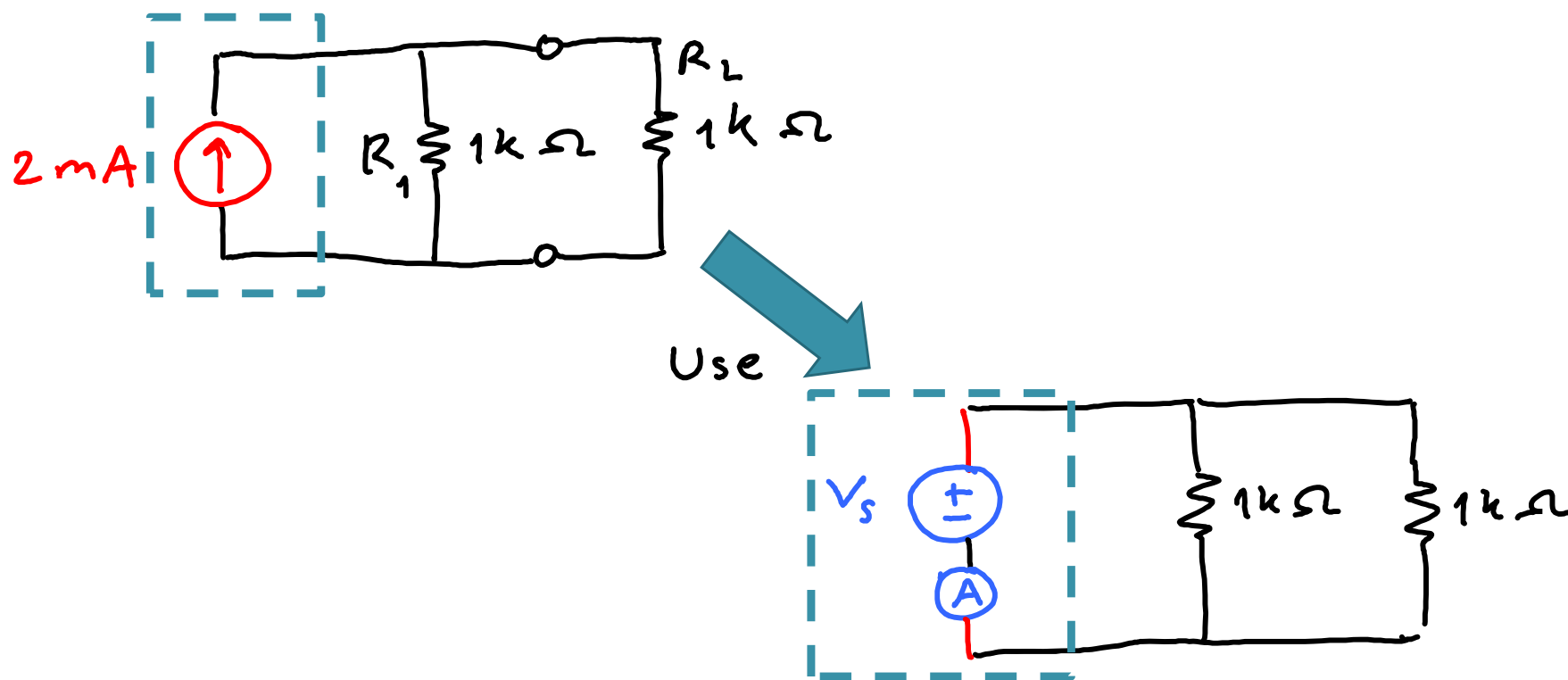


Act as a fake current source.

- **Caution:** When the circuit changes, need to readjust (the voltage on the voltage source and hence the current passing through it) back to the specified value.

Example 1 (1/2)

Suppose you want to construct the following circuit

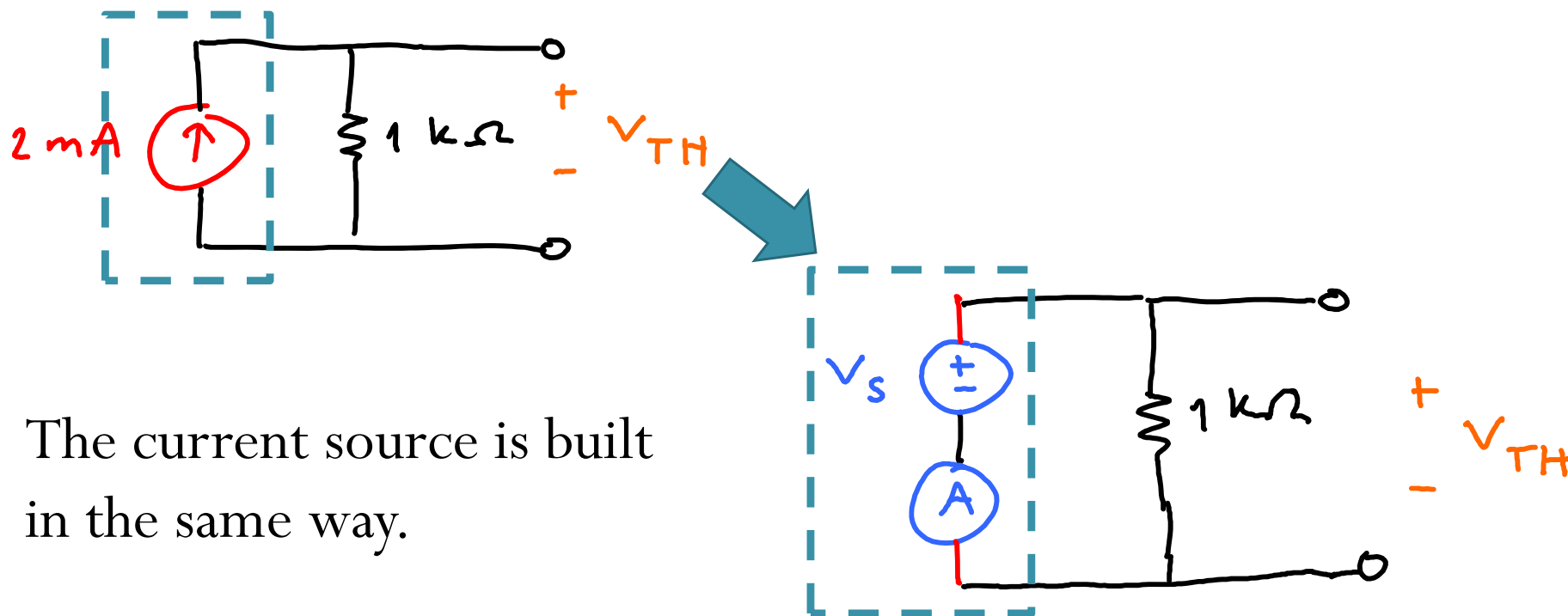


Adjust V_s to make 2 mA shows up on the DMM.

Note that $V_s = 1\text{ V}$ is required to make this happen.

Example 1 (2/2)

Suppose we want to find the Thevenin equivalent circuit at R_L (R_L is the load), then need to measure the open circuit voltage of



The current source is built in the same way.

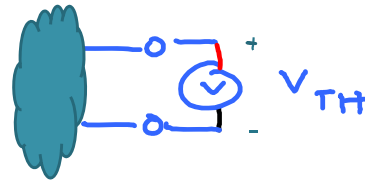
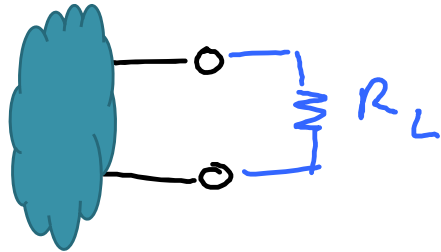
However, note that the original 1V for V_s will only give 1 mA. So, need to readjust V_s to 2V to get 2mA.

Source Deactivation

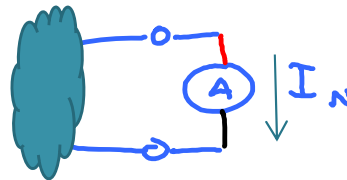
- In general, not the same as turning off the power supply.
- Definition: To deactivate a source means to set its output to be zero.
- For voltage source, having the value of 0 V means “short” circuit.
- For current source, having the value of 0 A means “open” circuit.

Thevenin's and Norton's Theorems

$V_{TH} =$ open-circuit voltage

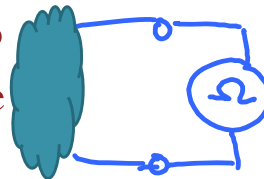


$I_N =$ short-circuit current



$R_{TH} = R_N =$ equivalent resistance when all sources are deactivated.

For R_{TH} , need to deactivate all the sources in here



Caution: If there is any "fake" current source, need to readjust (the voltage on the voltage source and hence the current passing through it) back to the specified value.